VOLUME XXXV NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

APRIL, 1919

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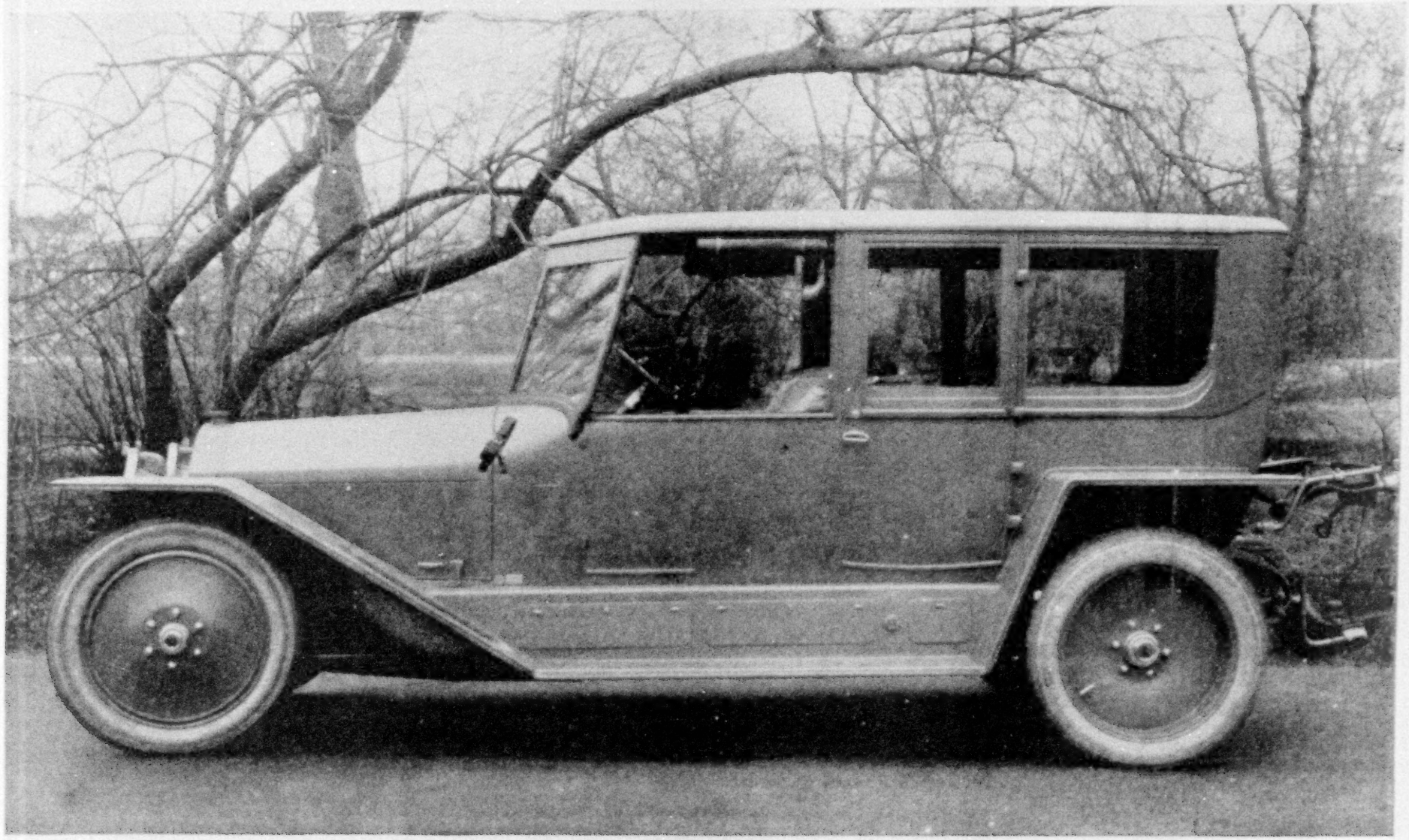

The Overseas Limousine Locomobile

A new Model, duplicate of the latest cars designed and sent to France for the use of General Pershing and the General Staff. Booklet describing this model sent upon request.

Custom design by
The Locomobile Company of America, Bridgeport, Conn.

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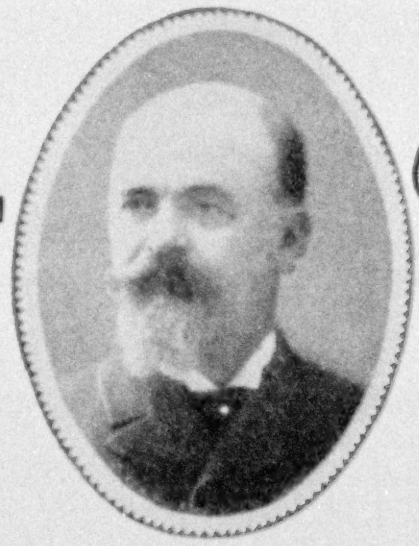
ORIGINAL PEPSIN CHEWING GUM



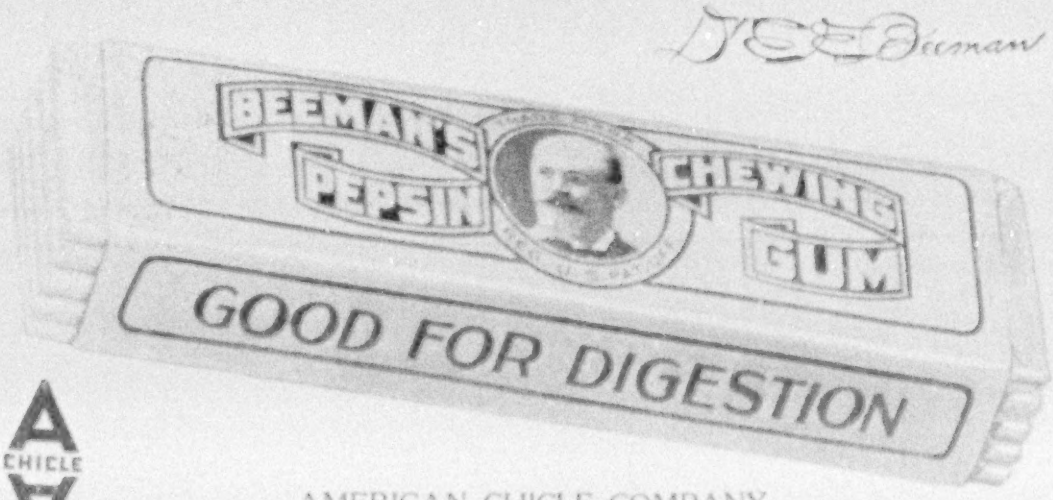
The great American ailment is indigestion

RAPID eating, keeping the brain constantly at work during meal time, and bad cookery—these lay the foundation for the conditions that nine out of every ten Americans suffer from. The food is imperfectly masticated, there is an insufficient flow of saliva, and the inevitable result is seen in the various mild forms of indigestion with which we are all familiar.

To relieve these conditions there is nothing better than the routine use of my original pepsin chewing gum. It stimulates the salivary glands, insures sufficient saliva, relaxes nerve tension, and aids the digestive processes.

Thousands have obtained relief from their digestive troubles by the simple expedient of chewing Beeman's Pepsin Gum for ten to twenty minutes after each meal.

J. C. Beeman



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Now World Influence

When France—the fountain head of motor-car learning—selected Marmon 34 for her great army staff, she confirmed the Marmon's title to Dominance, which America awarded the year this scientific car arrived.

This favor is international—it prevails in numerous countries overseas—in England, Sweden, Norway, Denmark, Spain, Argentina, Brazil, Cuba, Porto Rico, Chile, Peru, and elsewhere. Marmon engineering is helping to spread the gospel of American industrial achievement.

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Established 1851
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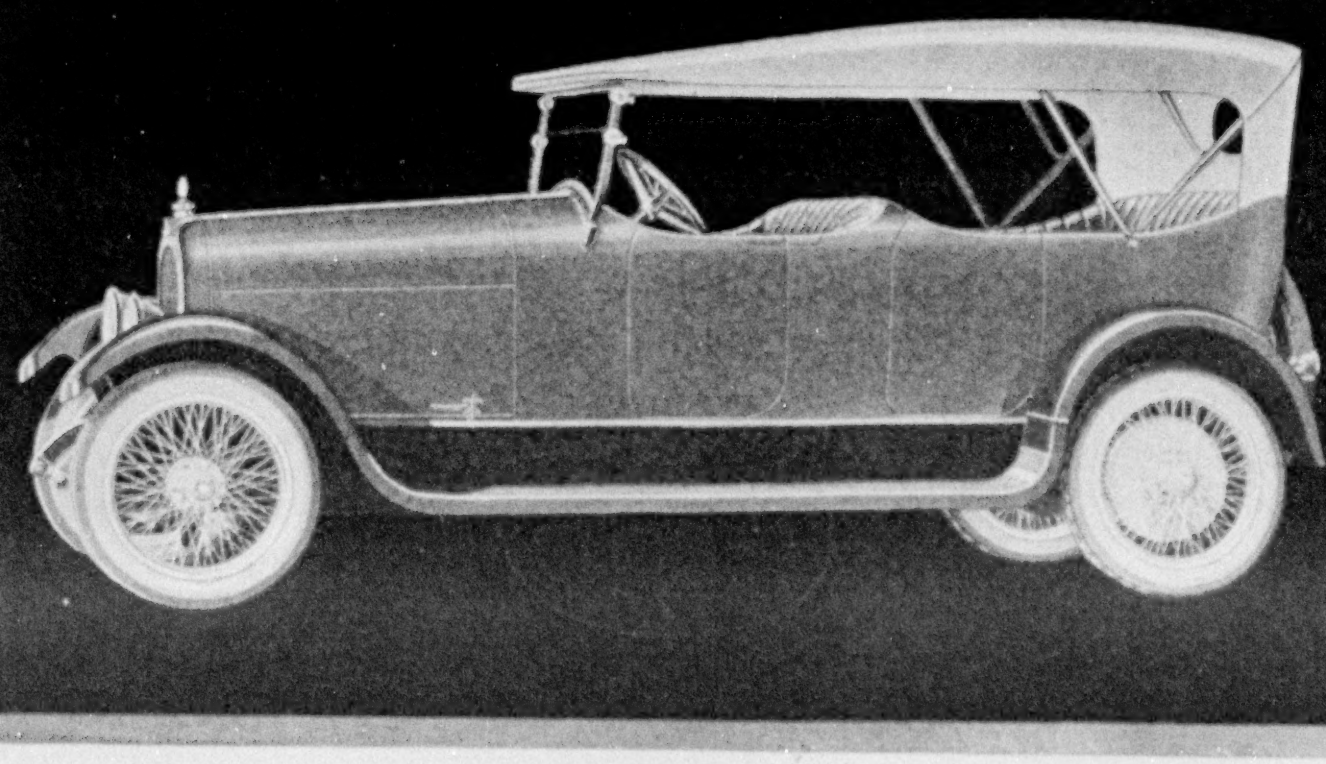

"Mention The Geographic—It identifies you"

MADE OF ZINC

The sheet of metal under the kitchen stove is Zinc. So are the corrugated surfaces of a washboard, the tops of fruit jars, the cases of dry cell batteries and the plates that protect the boilers of ocean steamships from corrosion.

In these and many other ways Zinc has long served many useful purposes; but it remained for The New Jersey Zinc Company to see and develop its greater possibilities. As a result of research and experimental work Zinc is now used for bottle caps, thimbles, clocks, buttons, shoe lace tips, building hardware and hundreds of other articles in daily use.

The working out of these new uses in the interest of manufacturers is typical of the completeness of the service this organization offers. The work of its laboratories is as much a part of its activities as the operating of its mines and smelters and is available to all manufacturers who use Zinc products.

THE NEW JERSEY ZINC COMPANY, *160 Front Street*, New York

ESTABLISHED 1848

CHICAGO: Mineral Point Zinc Company, 1111 Marquette Building

Manufacturers of Zinc Oxide, Spelter, Spiegeleisen, Lithopone, Sulphuric Acid, Rolled Zinc Strips and Plates, Zinc Dust, Salt Cake and Zinc Chloride

The world's standard for Zinc products

New Jersey zinc

He Shot the Gun

And Found that He Had the Greatest Wheat Food in Existence

Prof. A. P. Anderson knew that each wheat kernel contained some 125 million food cells.

He knew that each cell contained a trifle of moisture.

So he said, "I will turn that moisture to steam, then explode it. Thus I will burst every food cell so digestion can instantly act."

It Took Years, But He Did It

He finally solved the problem by sealing the grains in huge guns. Then he revolved the guns for one hour in 550 degrees of heat.

When he shot the guns every food cell exploded. About 125 million steam explosions occurred in every kernel.

Airy, Flaky Bubbles

The grains came out shaped as they grew, but puffed to bubbles, eight times normal size.

The fearful heat created a toasted nut flavor.

The explosions created flimsy morsels, which melted away at a touch.

He had what is recognized everywhere now as the most delicious wheat food in the world.

But above all it was a whole grain made wholly digestible. Every food cell was broken, and that never before was done.

He applied the same method to rice. Then to pellets of hominy, and created Corn Puffs.

Puffed Wheat Puffed Rice and Corn Puffs

Each 15c—Except in Far West

Now there are three Puffed Grains, each with its own delights. And happy children are now getting about two million dishes daily.

Don't let your children miss their share.

Keep all three kinds on hand.

The Quaker Oats Company

Sole Makers

(3034)

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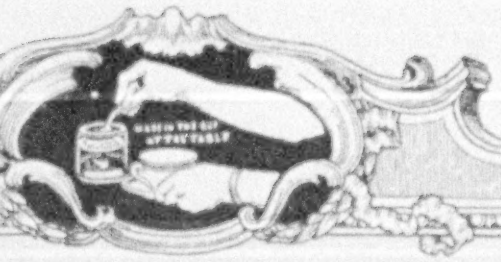


You wouldn't give up electricity and go back to candles

Those who have used electricity would not go back to candles, and matches would not be discarded for flint and steel. Neither would those who have tasted G. Washington's Coffee return to the old, uneven, unreliable, wasteful and slovenly methods of preparing coffee by hand. It is pure coffee, absolutely soluble, retaining all the delicious flavor and effect and made in the cup at the table.

G Washington's COFFEE

Was taken over by the Government for the boys in the trenches, and is now on sale again

---

To those who fuss with two pairs of glasses

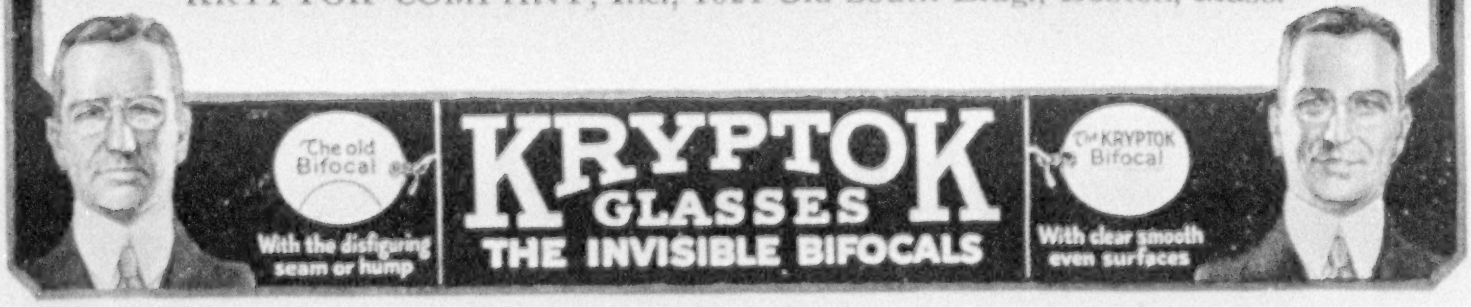
YOU fuss with two pairs of glasses because you think you must have one pair for close work and another for distance. You waste many precious moments changing from one pair to the other—or hunting for one of them.

Wear KRYPTOKS (*pronounced Crip-tocks*) and be freed from this two-pairs-of-glasses nuisance. They will give you *in one pair of glasses* the necessary correction for both reading and distance.

KRYPTOKS enable you to see both NEAR *and* FAR objects without that drawback to all other bifocals—the conspicuous, age-revealing seam or hump. Not the slightest trace of a dividing line can be detected between the lower part, which affords perfect *near* vision, and the upper part, which affords perfect *far* vision.

Ask your oculist, optometrist, or optician about KRYPTOK Glasses. *Write for booklet,* "The Eyeglass Experiences of Benjamin Franklin Brown."

KRYPTOK COMPANY, Inc., 1021 Old South Bldg., Boston, Mass.



"Mention The Geographic—It identifies you"

It's Not What You Pay For Your Tires That Counts

It's what your tires pay you.

Tens of thousands of experienced motorists and truck owners buy United States Tires as an investment in added safety, increased comfort and extra mileage. The handsome returns they get is ample proof that their confidence is warranted.

The line of United States Tires includes five separate and distinct types for passenger cars as well as two for trucks. Each is built to meet certain specific tire needs —and does its job to perfection.

It matters not what type car you drive—passenger or commercial—or what kind of roads you travel, among these United States Tires you will find exactly the ones to meet your individual requirements.

United States Tires are Good Tires

'Nobby' *'Chain'* *'Usco'* *'Plain'*

For passenger and light delivery cars—'Royal Cord', 'Nobby', 'Chain', 'Usco' and 'Plain'. Also tires for motor trucks, cycles and airplanes.

You Can Make Your Writing *T-a-l-k !*

Just as oratory puts the power of emphasis into the *spoken word*, so the—

MULTIPLEX HAMMOND

"Writing Machine"

—puts the all-telling power of emphasis into the *written word*.

No other typewriter can

turn cold type into **living, breathing words**—words pulsating with the writer's deepest convictions—words expressing to a nicety his most conventional mood—words showing always absolute correctness—**in business, professional or social usage.**

The business man

who uses the Multiplex can put character and individuality into his letters, and can emphasize the important parts by **changing instantly** from one style of type to another—"Just turn the Knob."

Note the five distinctly different type-styles reproduced in this advertisement.

The lawyer who swayed

judge and jury by his eloquence can write his **brief** on the Multiplex so that **every telling point scores with the judge.**

The author

can prepare his manuscript so that no climax or no subtle point will be lost—**can see his story practically in print** before it goes to the publisher.

The Multiplex is unlike any other typewriter

It is revolutionizing typewriting. Its work is as great an improvement over the typewriter as the earlier typewriter was over the fountain pen, or the fountain pen over the quill. Just think of being able to choose from over 365 different type-sets, including all languages!

Mail Coupon for FREE BOOKLET

It will show you how, with the Multiplex, you can put the force of emphasis into your typed matter—how you can drive home with strength of accent the fullness of your argument—how you can write with the same convincing force that you use in speaking—an **exclusive feature** of the Multiplex.

We will also send our pamphlet, **"The President and His Typewriter."**

ALSO A

PORTABLE MODEL

For Traveling—for Home. Weighs about 11 lbs. Full capacity. Ask for special folder.

Write your name, address, and occupation below and mail to—

HAMMOND TYPEWRITER CO.
637 E. 69th St., New York City

Name: .....

Address: .....

Occupation: .....

Vacation in the Pine Scented Lakelands of Canada

In the "Highlands of Ontario," that wonderful region of scenic beauty, you can Fish, Swim, Golf, Canoe, Camp, Hunt—spend a vacation you will never regret or forget. Mirror-like lakes set in the grandeur of forests of pine and balsam. The purest of air, 1,000 to 2,000 feet above the sea, and hay fever is unknown.

Famous Playgrounds for Outdoor Men and Women

"Algonquin Park"—"30,000 Islands of Georgian Bay"—"Kawartha Lakes"—"Muskoka Lakes"—"Timagami" and the "Lake of Bays." Modern hotels—or "rough" it if you prefer. Any Grand Trunk Agent will gladly plan your trip for you. Write any of the following for descriptive literature:

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AT THE FIRST DROP OF RAIN

Obey that Impulse

Put on Your

WEED TIRE CHAINS

THE ONLY DEPENDABLE SAFEGUARD
AGAINST SKIDDING

AMERICAN CHAIN COMPANY, INC., BRIDGEPORT, CONN.

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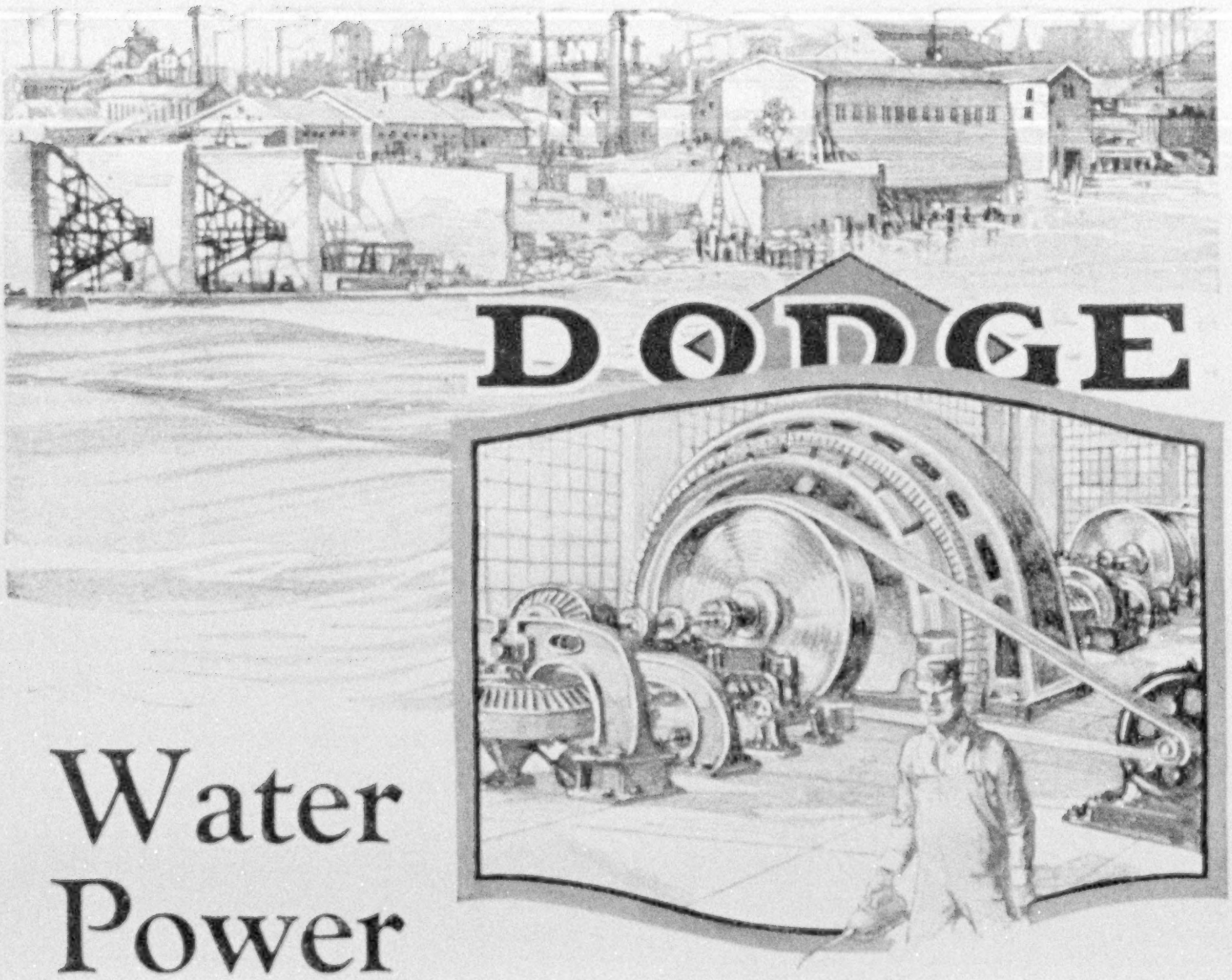

Water Power

Water power, steam power or electric power are best transmitted in all industries through the medium of Dodge products.

Dodge Products are distributed from the great Dodge plants at Mishawaka, Indiana, and Oneida, New York, to 13 branch warehouses located in each industrial center of America. 500 of the very best mill supply dealers in America redistribute Dodge, Oneida and Keystone products—all Dodge built.

The Dodge Idea of service is the power users' ideal of service—What you want when you want it.

Dodge Products are standard products—recognized throughout industry as representing the very best of engineering design and production.

Dodge distribution is thorough, our dealers will supply your average needs from their own stocks, delivering on the same day that you phone the order.

No other builder of power transmission appliances distributes so complete a line of standardized products over so great an area.

If you have in mind an addition to your present plant, or will change from the manufacture of one product to another, put your problems of power distribution up to Dodge Engineers—they are located in every Dodge Branch and there is no charge for their services.

Are you reading "The Dodge Idea?" This monthly magazine of industrial progress is read by 32,000 executives, superintendents and engineers. It will be sent free for six months if you send in your name. State also if you have the new Dodge D-19 Catalog.

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Distributors of the Products of the Dodge Manufacturing Company

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Philadelphia Cincinnati New York Chicago St. Louis Boston Atlanta
Pittsburgh Minneapolis Dallas Providence Seattle Newark

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The Deeper Meaning of Memorial Day

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On this day the thoughts of all Americans turn to the departed, no matter what the place or cause of death. Wreaths are placed on graves, new memorials are erected, plans for new memorials are made. And either of the three privileges is as sacred as the others.

Memorial Day is the most fitting time for dedicating such memorials. Why not consult your dealer now and start your plans so that the new memorial may be dedicated on or near this national day of tribute?

Ask him to tell you about the merits and advantages of Dark Barre Granite—The Rock of Ages.

In beauty, in adaptability to perfect polishing or any treatment, and in sturdiness of texture that gives it the character of real *permanence*, The Rock of Ages represents all that a material for memorials, public or private, pretentious or inexpensive, should be.

A handsomely illustrated book, "The Rock of Ages," will be sent to you on request. Any dealer in memorials can show you specimens and tell you about the superior qualities of this enduring stone.

Boutwell, Milne & Varnum Company

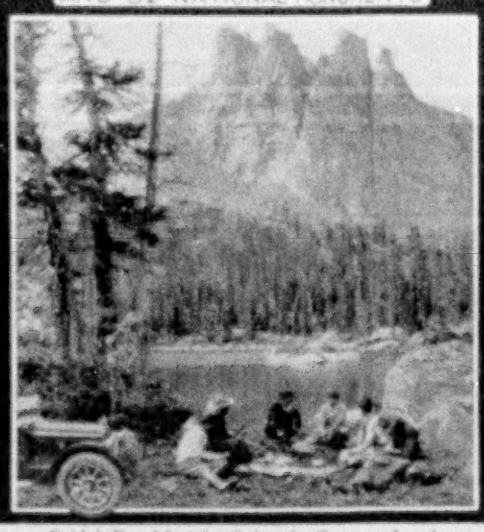
Department H
Montpelier, Vermont
Quarries at Barre, Vt.

The Granite Center of the World

ROCK OF AGES
TRADE MARK

DENVER THE GATEWAY

TO 12 NATIONAL PARKS AND 32 NATIONAL MONUMENTS



Bridal Breakfast in Colorado Scenery Land

These natural historic and scenic wonderlands are owned and maintained by the United States as the Nation's free vacationland for rest and recreation.

ROCKY MOUNTAIN NATIONAL PARK (Estes) and DENVER'S NEW MOUNTAIN PARKS

are the most beautiful and unique scenic auto trips in the world. Enjoy camping, fishing, mountain climbing, motoring and outdoor sports in Colorado.

WRITE FOR FREE BOOKLETS

that tell where to go, what to see and what it costs to vacation in the Colorado Rockies. Low railroad rates.

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514 17th Street, Denver, Colo.

Millions of Prompt Payments

DURING the last 37 years millions of payments of principal and interest on bonds safeguarded under the *Straus Plan* have been made through us to investors.

Every payment of interest has been made on the day due, on presentation of coupons. More important, every payment of principal has been made when due. There has been no loss or delay.

Write today for literature describing the *Straus Plan* of safeguarding investments and the sound first mortgage 6% serial bonds we offer in $1,000, $500, and $100 denominations. Ask for

Circular No. D-908

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Established 1882 — Incorporated
NEW YORK — 150 Broadway
CHICAGO — Straus Building
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37 years without loss to any investor

Pocono Hills Model
Five Rooms

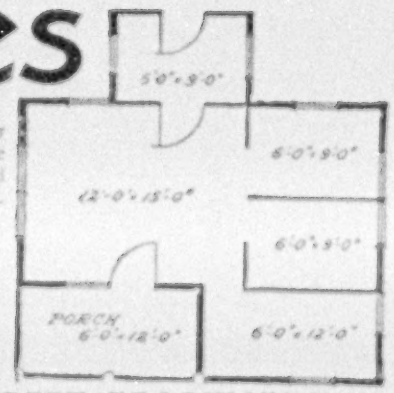
$575.00
f. o. b. Brooklyn

Enjoy Outdoor Life This Summer

Wouldn't it delight your family to have this rustic five-room bungalow set up in the place of your Winter fireside reveries—down near the foaming breakers at the seashore, or on a bluff overlooking a placid lake, or perhaps in the shade of the woods?

This Bossert Bungalow—one of the famous line of

Bossert Houses



Is a better job of building than could be done by hand labor, and the cost is much less. It is built complete at the Bossert Plant and shipped in sections. Any two persons can, without experience, put it up quickly and easily. Single walled, no interior finish. Exterior artistically stained brown with creosote, a better preservative than paint. For seashore, paint might be preferred and same price would apply with priming coat. Shutters stained green and are made solid for winter closing. Absolute satisfaction guaranteed.

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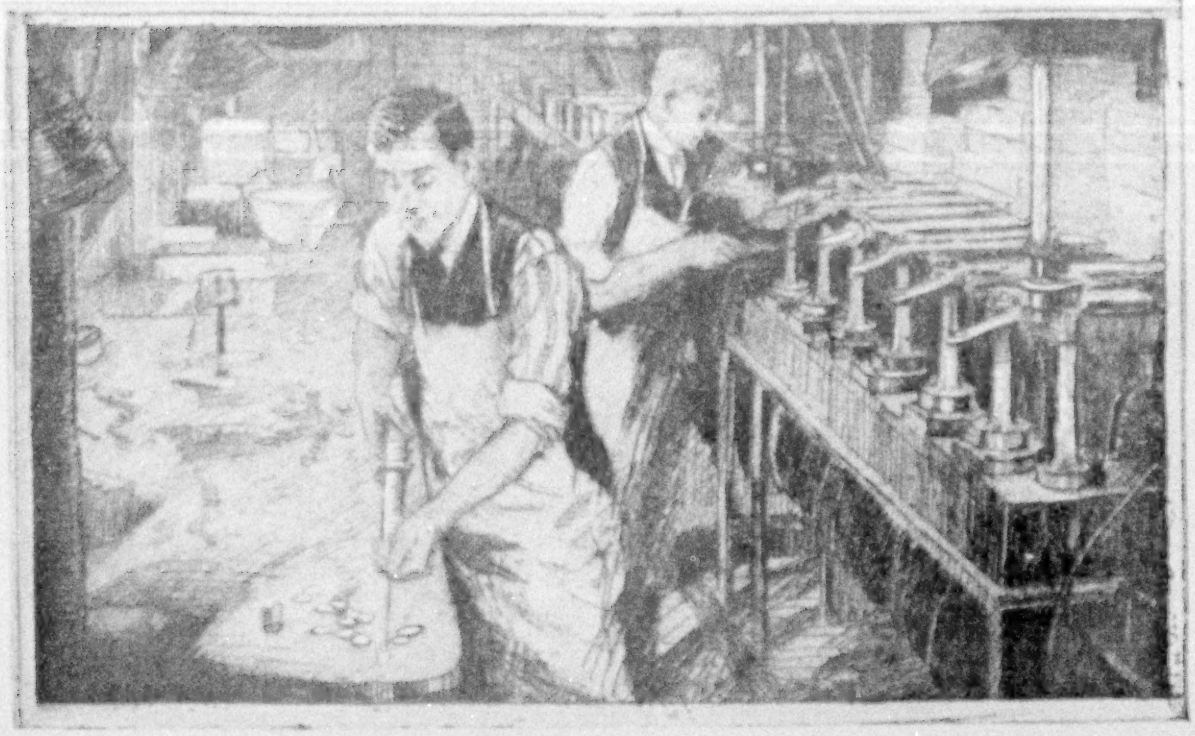
Price of Bossert "Pocono Hills" Bungalow, $575 f.o.b. Brooklyn. Send check or money order for $143.75. Pay balance of $431.25 when notified bungalow is ready for shipment. Send 18 cents for catalog showing the complete line of Bossert Houses.

LOUIS BOSSERT & SONS, INC. - - - 1313 GRAND STREET, BROOKLYN, N. Y.

WALTHAM THE SCIENTIFICALLY BUILT WATCH



AND THE FOREIGN BUILT WATCH

The Lower Plate

Know Something About the "Works" in the Watch You Buy

IF you open your watch and examine its mechanism, you will find it consists substantially of two supporting plates, between which is mounted a gearing of meshed wheels to take care of the movement, recording time. This is called the train, which we will speak of in our next advertisement.

The lower supporting plate in a Waltham watch is the foundation upon which every unit revolves and is fixed. It is bored with minute holes to take the pivots, screws, pinions, etc.

This lower plate is drilled and threaded by one of the most exclusive and wonderful machines ever designed by the genius of man — an exclusive Waltham invention from the master-mind of Duane H. Church.

Many operations are accomplished with such methodical, automatic regularity that one instinctively imagines that a marvelous human brain guides the extraordinary operations of this machine.

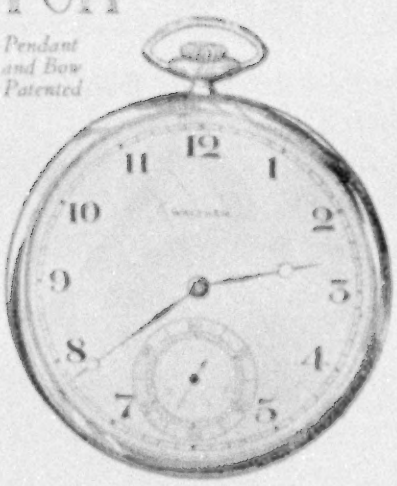
It makes every operation (and there are 141) with infinitesimal exactness to the ten thousandth part of an inch — flawless, beautiful in its complex simplicity — every plate a replica of every other plate, proving Waltham standardization to be one of the miracles of American mechanical genius.

The plate of the foreign built watch is subject to the variations of hand process. Made to variant sizes and models without precise relation to the parts which they are to contain, which parts are made elsewhere in many homes and small shops, by hand.

No hand work could ever approximate the beautiful and flawless exactitude of this Waltham drilling and threading.

So when you buy a Waltham watch you are assured of a standardization of quality and leadership which has placed the Waltham watch on the pedestal of world dominion.

Pendant and Bow Patented



Waltham Colonial A
Extremely thin at no sacrifice of accuracy
Maximus movement 21 jewels
Riverside movement 19 jewels
$135 to $255 or more
depending upon the case

WALTHAM

THE WORLD'S WATCH OVER TIME

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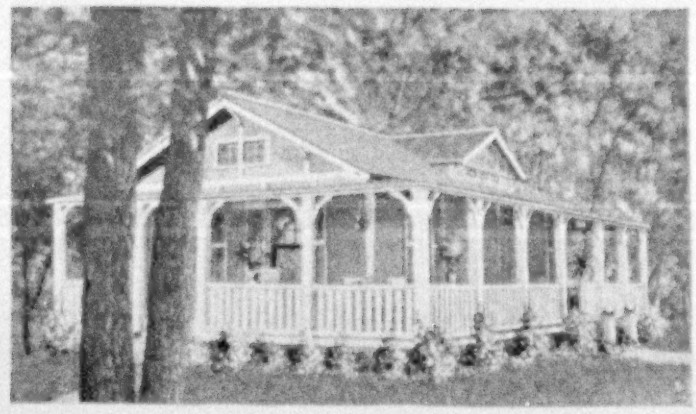
LISTERINE

THE SAFE ANTISEPTIC

So effective, so agreeable and so easily used it makes the promotion of oral and personal hygiene a simple part of the daily toilet.

A dressing for wounds, cuts and abrasions.
A refreshing mouth-wash-dentifrice.
A gargle, spray or douche.
A shaving lotion.

Manufactured only by
Lambert Pharmacal Company
St. Louis, U. S. A.



OUR war work is done. We can now supply our Gold Bond Portable Houses, Bungalows, Garages, Chapels, Schools, and Industrial Homes. Not a nail to drive—not a board to cut. Ready built in sections—not in hundreds of pieces. Doors, windows, with glass and hardware, hung in place. Just a wrench and a screw-driver puts up your house in a day or two. No carpenters needed. Single or double construction for summer or all year round.

Have that cottage in the woods or by the water now. Have that garage now. Erect cozy homes for your workmen now. Send 15 cents in stamps for 64-page catalog showing these buildings in color, with floor plans, descriptions, etc.

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440 Main St., Saginaw, Mich.

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THE BRUSH THAT HAS ELASTICITY AND SOFTNESS
AND RUBS IN THE LATHER IS THE

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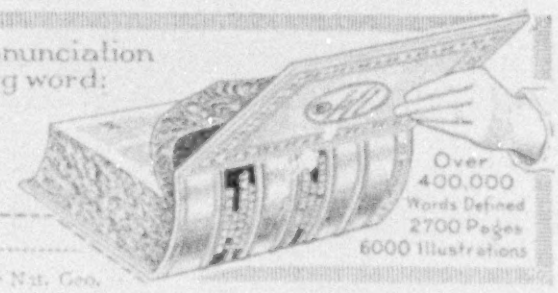
NAME .....
ADDRESS ..... Nat. Geo.



The Pro-phy-lac-tic Tooth Brush

Earned its reputation by "mouth to mouth" advertising

How are the future executives of business being trained?

EVERY day, in business, new men are moving to the top. What sets these men apart for progress?

In what do they differ from their fellows? In natural ability? Yes. But chiefly in something else—in the training that gives them sure judgment and an unhesitating self-confidence.

In the panel on this page are the names of nineteen great corporations, representing aggregate resources of billions of dollars. *Over 3600 men—the ablest, most promising younger men in these nineteen leading companies—are enrolled in the Alexander Hamilton Institute's Modern Business Course and Service.*

Companies in which there are more than 100 subscribers for the Modern Business Course and Service

Armour and Company	121
Burroughs Adding Machine Company	104
Commonwealth Edison Company of Chicago	104
E. I. duPont de Nemours and Company	254
Ford Motor Company	329
General Electric Company	490
B. F. Goodrich Company	123
Goodyear Tire and Rubber Company	220
National Cash Register Co.	181
National City Bank of New York	132
New York Telephone Co.	109
Pennsylvania Railroad Co.	135
Standard Oil Company of California	161
Texas Company	107
United States Steel Corporation	405
Western Electric Company	146
Western Union Telegraph Co.	116
Westinghouse Electric and Manufacturing Company	273
Winchester Repeating Arms Co.	107

With all the resources of modern business at their command, these 3600 men have decided that this Course will fit them best for really big things.

Surely such a training, so magnificently endorsed, is worthy of your investigation at least.

The Institution that fits a man to handle really big business

For ten years the Alexander Hamilton Institute has been entering one American business organization after another—always with the approval of the higher executives.

It is *the* Institution that has proved its power to train men for positions of executive responsibility. It offers only one Course; it has no specialized training to fit men for departmental positions of limited opportunity.

Its business is to take men who know only one department of business, whatever it may be, and to add a knowledge of organization, of sales, of merchandising, of credit, of corporation finance, of advertising, of accounting, of investment, of traffic and costs.

It gives such men the knowledge of all departments that will fit them to direct the work of other men.

This advertisement is addressed to two types of men. First, to the chief executives of corporations, large or small. In such men's minds the question arises every day: "What can I do to be sure that my company will make steady progress thru the next ten years?"

Are you content to stand still while your competitors outstrip you?

Here is one thing you can do today: You can investigate an Institution that has proved its power to increase the chief asset of the nineteen great corporations listed on this page. You can help your men to grow; and their growth will automatically take care of yours.

And the advertisement is addressed also to every man who is looking toward the future; to every man who is asking himself, "Where am I going to be ten years from now?"

If *you* are such a man; if you want the next ten years to bring you satisfaction instead of regret, a moment's decision now may change the whole record of your future.

Investigation is easy

The Alexander Hamilton Institute courts the fullest investigation. Some of the 85,000 men who have benefited by its training are in your very neighborhood; ask them.

Or—to make the matter even more simple—send for "Forging Ahead in Business," the 112-page book that has grown out of the Institute's ten years of training men for success.

It is a book full of valuable information; it tells what the Institute has done for other men and other companies—and it is free. Send for your copy now.

ALEXANDER HAMILTON INSTITUTE
68 Astor Place New York City

Send me "Forging Ahead in Business" FREE

Name .....
Print here

Business Address .....

.....

Business Position .....

XUM

In some of the villages where our men are billeted they have community wash troughs. They are several feet long, and about two feet wide, with a partition running down the center. In the morning our soldiers will wash their hands and faces on one side of the trough while French civilians perform their ablutions on the other. Private _____ was thus engaged today when his cake of Ivory soap started to slip from a slanting board into the water. A mademoiselle on the other side made a frantic grab and recovered the soap, thinking that it would disappear into the opaque depths of the trough. B_____ then deliberately tossed the soap into the water. "Il flotte," screamed mademoiselle delightedly, unconsciously paraphrasing a well-known advertisement. She had never seen soap behave in that way before.

As I strolled into a neighboring village the other evening the un-

—*From "Intimate Notes on the Firing Line," in Los Angeles Times, Sept. 27, 1918.*

"It Floats!"

Suppose you were to see Ivory Soap for the first time—wouldn't you be amazed and delighted to find it always floating conveniently at hand in washbowl, dishpan or tub?

IVORY SOAP. . . IVORY IT FLOATS . 99 44/100 % PURE

VOL. XXXV, No. 4 WASHINGTON APRIL, 1919

THE NATIONAL GEOGRAPHIC MAGAZINE

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THE CONE-DWELLERS OF ASIA MINOR*

A Primitive People Who Live in Nature-Made Apartment Houses, Fashioned by Volcanic Violence and Trickling Streams

BY J. R. SITLINGTON STERRETT

The author of the following account of the Troglodytes of Cappadocia stood at the head of American geographers whose researches in Asia Minor have revealed to modern man many pages in the absorbing history of the human race. His death occurred at a time when he was completing arrangements for another expedition of greater magnitude than any he had previously undertaken. Dr. Sterrett's photographs illustrating this article afford the only comprehensive idea of the cone-dwellings—formed by the forces of nature, but excavated by the Troglodytes—yet given to the Western World.

IT IS a curious paradox in the history of human migrations and human development that in that very land which historians and geographers characterize as "the cradle of civilization" there is to be found today a people whose mode of living is, in one of its basic principles, more primitive than that of the most benighted tribes of Africa or the South Pacific, remote from the warming and enlightening influence of modern thought and progress.

Residing within a stone's throw, metaphorically speaking, of the wonderful civilization which flourished on the banks of the Nile 6,000 years ago; of the mighty kingdoms of Assyria and Babylonia which arose in the valleys of the Euphrates and the Tigris, their power and splendor dazzling the world 2,000 years before the Christian era; and at the very threshold of ancient Greece, with its unrivaled culture and political advancement, the Troglodytes of Cappadocia still retain toward their fellow-men an attitude of mind akin to that which obtained in the Stone Age, when there was no such thing as human society, but every man was his own law and the mortal enemy of his neighbor.

The only difference between the society of these Troglodytes and that of primitive man consists in this, that primitive man did not brook the presence of any other man, while here the isolation of the clan takes the place of the isolation of the individual.

CONES CLUSTER AROUND EXTINCT VOLCANO

The caves, cones, and cliff dwellings of the Cappadocian Troglodytes of both

* See also, in the NATIONAL GEOGRAPHIC MAGAZINE, "The Mole Men: An Account of the Troglodytes of Southern Tunisia," September, 1911, and "China's Treasures," including a description of the cliff temples of Lung-Men, October, 1912.

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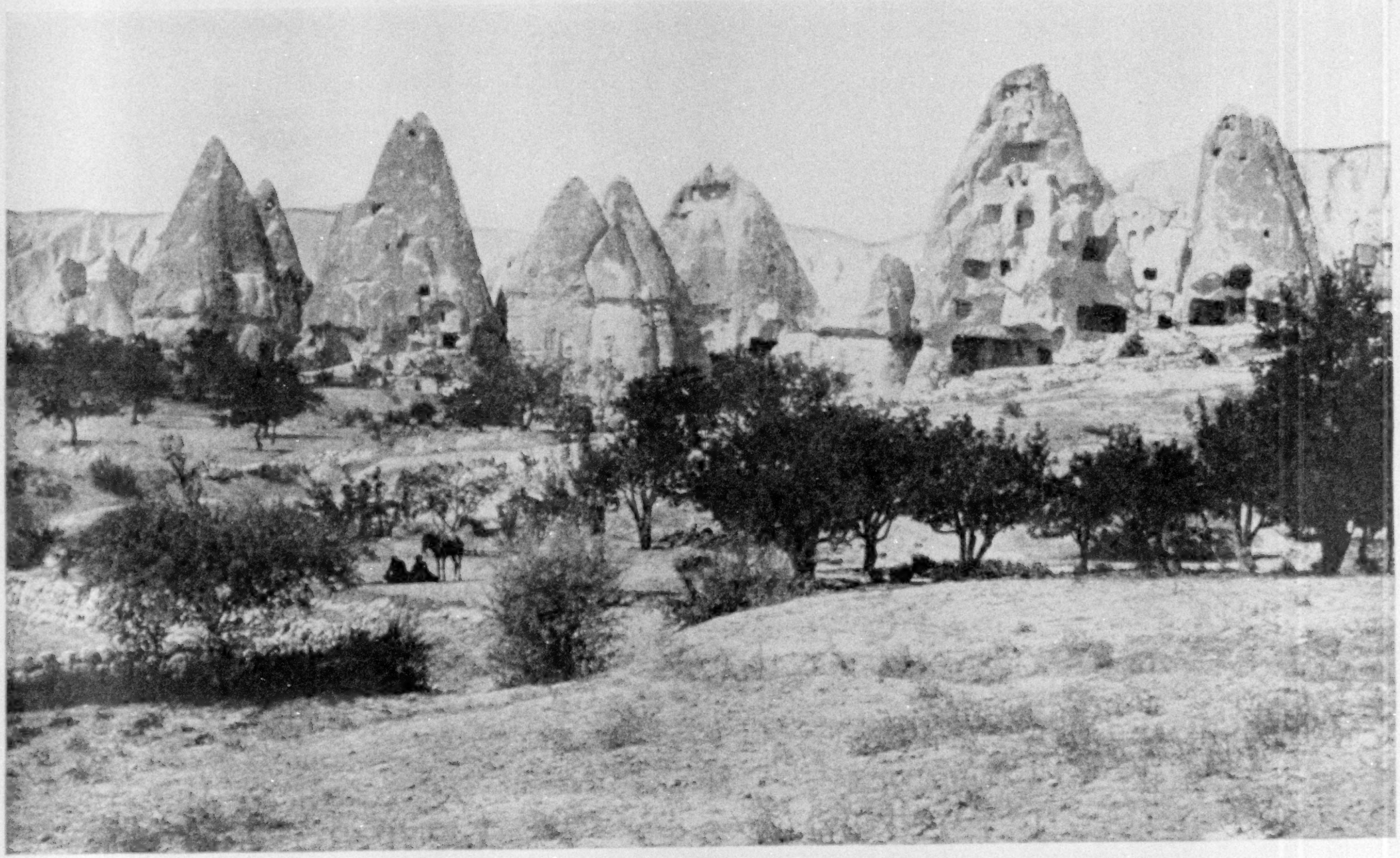
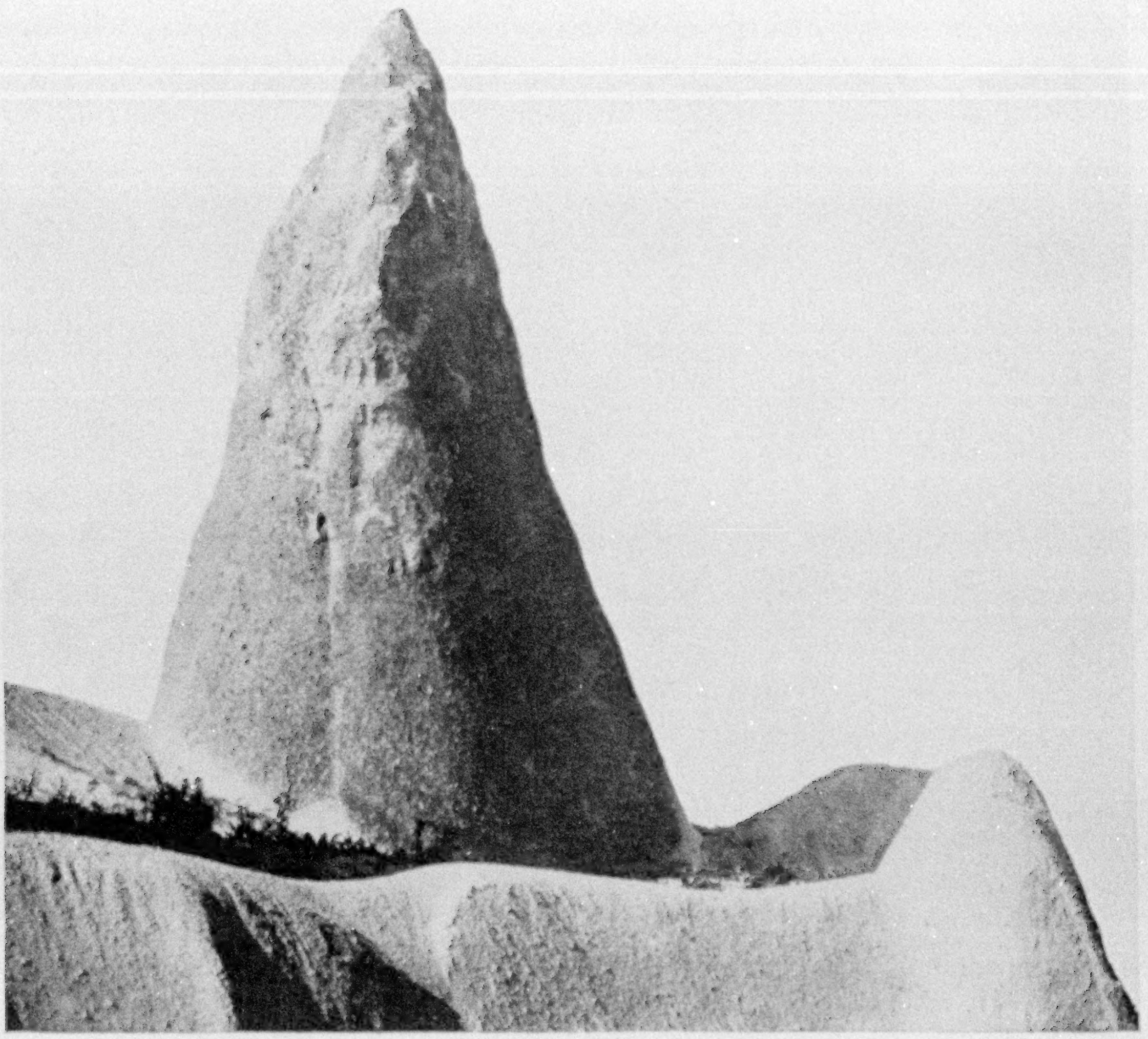


THEIR PALACES WERE PINNACLES

The face of one of these cones is so badly broken away that many of the interior chambers are exposed, and we can see that this cone on the right had nine stories. Most of the cones are literally honeycombed until they are mere shells. This is a typical scene, showing the conjunction of barren and fertile country.



THIS PHOTOGRAPH IS INTENDED TO CONVEY A VIVID IMPRESSION OF THE UNEXCAVATED CONE IN ITS SEMI-PRISTINE BEAUTY

It originally had a cap and was very much larger than it is now. After its cap of lava had fallen off, in consequence of the rotting of the stone under the weathering of millennia, the cone rapidly decreased in size.

ancient and modern times are to be found in greatest number in the shadow of Asia Minor's loftiest peak, snow-clad Mt. Argæus (called by the Turks Erjias Dagh), an extinct volcano whose eruption in the dim past laid the foundations and supplied the material for these remarkable habitations, while the Halys River of the ancients (now known as Kizil Irmak) in succeeding centuries became their tireless architect (see text, page 318, and map, page 315).

The practice of living in caves, in cliffs, or in excavated cavities in the open plain is to be traced to a state of society which we of today have some difficulty in depicting to ourselves. And yet the central thought of the Troglodytic* habit is the basic principle upon which ancient civilization was founded.

That basic thought was absolute isolation—a thought which is wholly antagonistic to our modern conceptions of society, whether we have in mind the community of a country-side, a village, a town, or a State; because, where absolute isolation is the dominant obsession

* The term *troglodyte* is a Greek compound word, whose first element, *trogle*, means "hole," while its second element is derived from the verb *duo*, which means "to go, get, dive, or plunge into." Hence, a troglodyte is a man who goes into a hole—lives in a hole.

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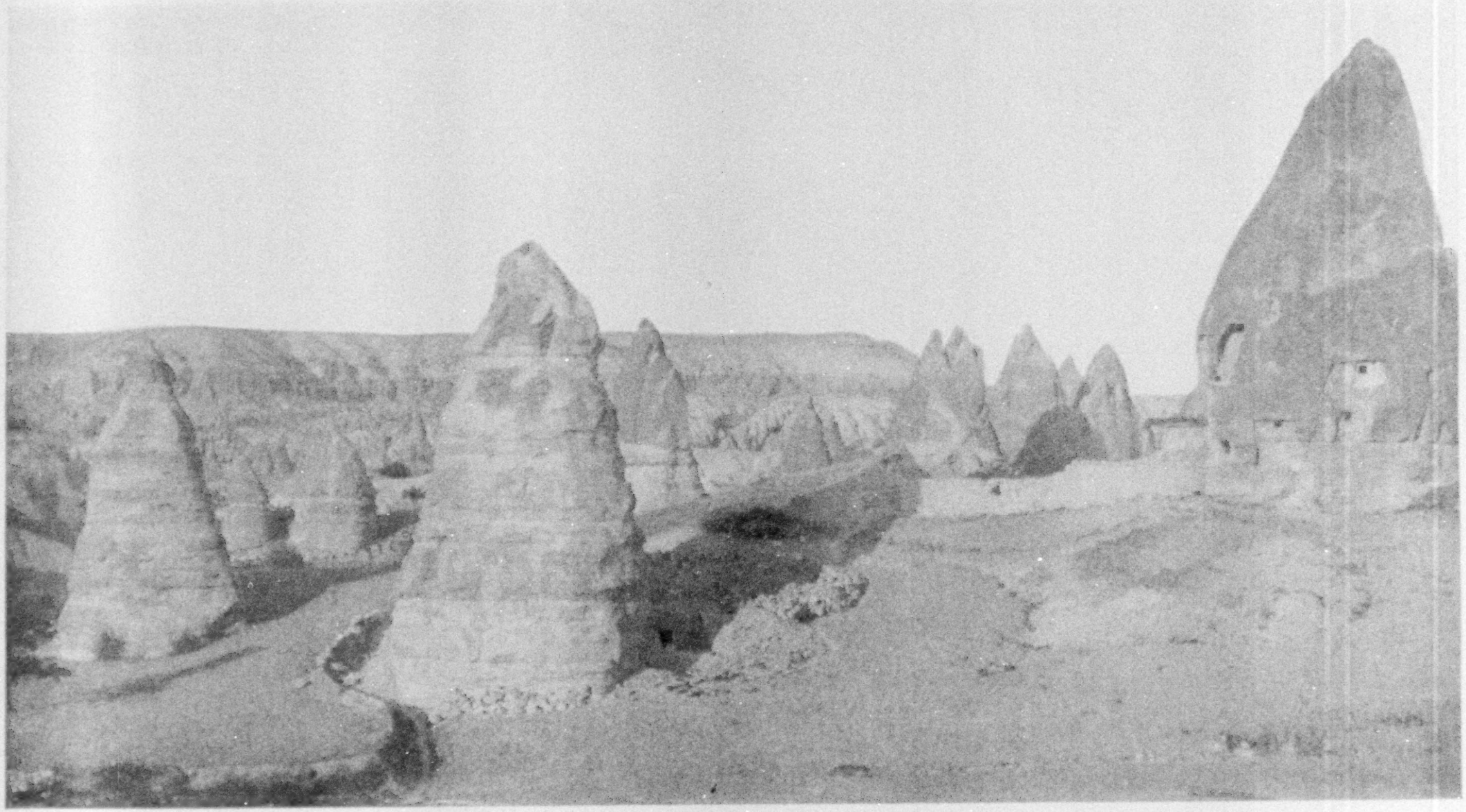

THE HEIGHT OF THE CONES VARIES VERY MUCH, RANGING FROM FIFTY TO THREE HUNDRED FEET

One of the older travelers puts the extreme height at four hundred feet, which is regarded as an overestimate, though it is difficult to judge height accurately by the unaided eye. Note the dwellings in the cones.

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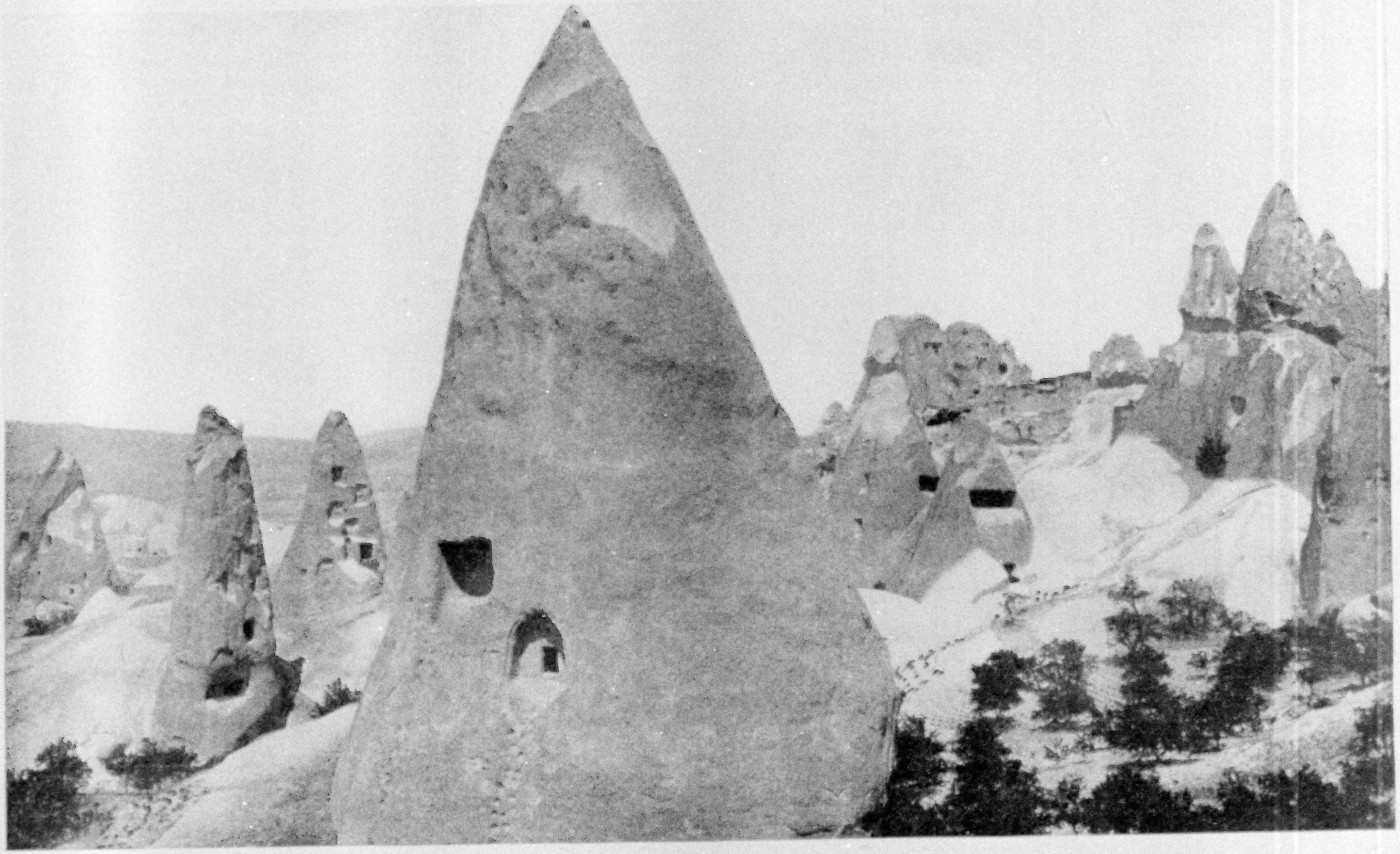


IN MANY CASES, AS IN THIS ILLUSTRATION, THE ENTRANCE IS HIGH ABOVE THE GROUND

Ingress is attained by means of two parallel and perpendicular rows of holes, cut at regular intervals, so that one had to climb to the door of the house by using both hands and feet. In this fine cone we have two separate dwellings, as the finger-and-toe holes of entrance show. The great height of these cones is clearly shown by comparison with the trees (see illustration, page 293).

THE CENTER OF THESE WHITE CONES IS UDJ ASSARU, A HUGE MASS OF PUMICE-STONE WHICH LIFTS ITS LOFTY HEAD IN THE MIDST OF MANY BRANCHING VALLEYS, SUCH AS ARE SHOWN ON PAGES 290, 296, AND 316

The name means "the Castle of Udj," but it is not known whether Udj is the name of a princeling or that of a place or district. The earlier travelers called this mass Uetch Hissar, "three castles." It is honeycombed with vast chambers excavated by man in the remote past. Note the women in the right foreground.

XUM

HERE UDJ ASSARÜ IS SEEN IN THE DISTANCE (SEE PRECEDING PAGE)

This photograph is of very great importance, because it contains the history of this entire Troglodytic region. In the foreground we see the naked, barren pumice-stone, with spots of overlying lava, or peperine. The disintegrated atoms of pumice-stone are swiftly swept away by the rain-water to the valley below, so the upper country always remains quite barren. The process of erosion is clearly seen here. Note the presence of cones even at this elevation, for a beautiful cone stands on the very summit of the ridge at the left of Udj Assarü and five other fine ones are to be seen on the right of Udj Assarü. This means that an almost inconceivable amount of erosion has taken place here. It means that the original level of the plateau corresponded approximately with the tiptop of Udj Assarü itself, and that all the rest of the plateau has rotted off and been washed away. Accordingly, the cone formations are not of comparatively recent date, as some have contended from the fact that no ancient writer mentions the cones. On the contrary, this plateau was in existence in most remote antiquity.

THIS PHOTOGRAPH, TAKEN FROM THE UDJ ASSARÛ (SEE PAGES 286-287), GIVES A GENERAL VIEW OF A SERIES OF EROSION CANYONS, SUCH AS ARE SHOWN ON PAGES 290, 296, AND 316

In the far distance, or on the horizon, the original level of the pumice bed is to be seen. The cones are so numerous that they seem like mere striations. The immediate foreground of the picture lies just below the original level of the plateau, and it shows the work of erosion. Nearly 50,000 cones are in the area covered by this photograph. In the right foreground appears a cone, while hundreds may be discerned in the background (see text, page 325).

XUM

XUM

MANY OF THE CONES WERE NEVER EXCAVATED INTO DWELLINGS; IT IS NOT EASY TO UNDERSTAND JUST WHY SO FINE A SPECIMEN AS THE ONE IN THE FOREGROUND HERE SHOULD NOT HAVE BEEN UTILIZED

The middle distance is occupied by a modern Troglodyte village, and the lofty Udj Assarü (see pages 286-287) is seen in the background. Stratification makes the immense caps possible. Note that the cap of the cone near the center of the picture occupies about three-fourths of the entire height of the cone.

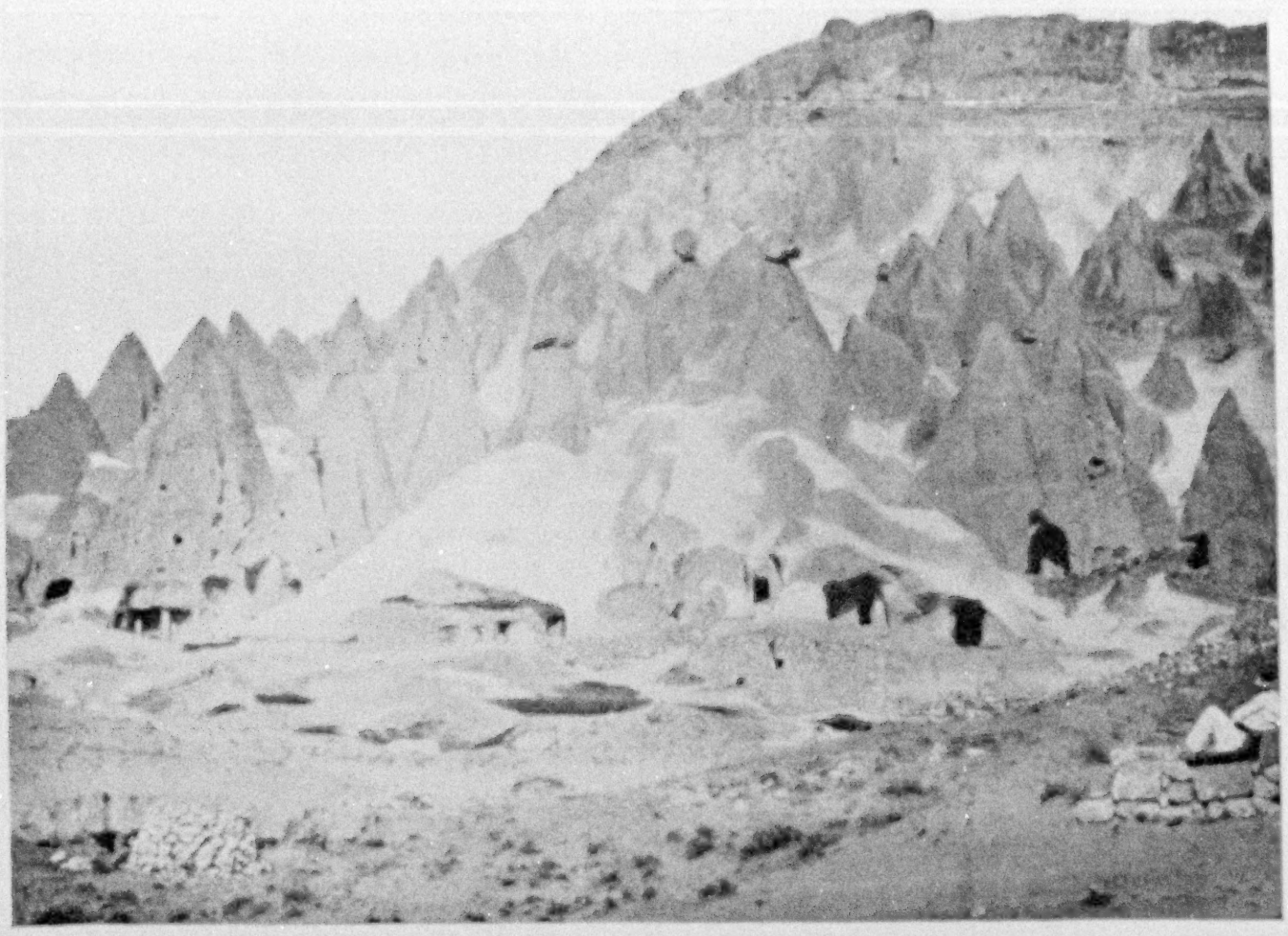
IN THE COURSE OF THE CENTURIES THE STREAMS OF WATER WHICH WERE ABLE TO FORCE THEMSELVES UP, EVEN THROUGH THE THICK BED OF LAVA, HAVE HOLLOWED OUT CANYONS OF GREAT DEPTH AND WIDTH: A SCENE NEAR UDJ ASSARÜ

Such a canyon is seen here; one also sees that the mass of pumice was not worn away evenly and equally at all spots by the solvent action of the flowing water. In places the stone offered a sturdier resistance to the abrasive influences, and the result was the formation of tens of thousands of cones, some of which are free-standing, while others are closely engaged with each other. In this picture we see one side of a valley formed by erosion. On the left the rim of the bluff gives approximately the original level of the pumice-field. In the center is a small, but perfect cone. In the middle distance there is stratification, which runs through cones and obelisks that are now entirely free-standing; where stratification appears, the cones are more in the shape of obelisks, such as are illustrated on page 205.

XUM

EVEN THE UPLANDS, WHOSE SOIL CONSISTS WHOLLY OF DISINTEGRATED AND ASHLIKE PUMICE-STONE, PRODUCE NOT ONLY GRAPES AND FRUIT (AS CAN BE SEEN IN THE MIDDLE DISTANCE), BUT BEANS, MELONS, CUCUMBERS, ETC.

One sees small fields in the lowlands in this picture and dwellings in the cliffs.



HERE NOTICE THE LAYER OF LAVA SUPERIMPOSED UPON THE GREAT BED OF PUMICE-STONE

On the right we see cones in the incipient stage—that is, in the actual process of formation—and looking for all the world as if they were half buried in snow. From the left of the picture one gets an idea of how closely the cones stand together. In places it is very difficult to thread one's way through them.

of a man, there can be, strictly speaking, no such thing as a united State.

HOW PRIMITIVE MAN VIEWED HIS FELLOW-BEINGS

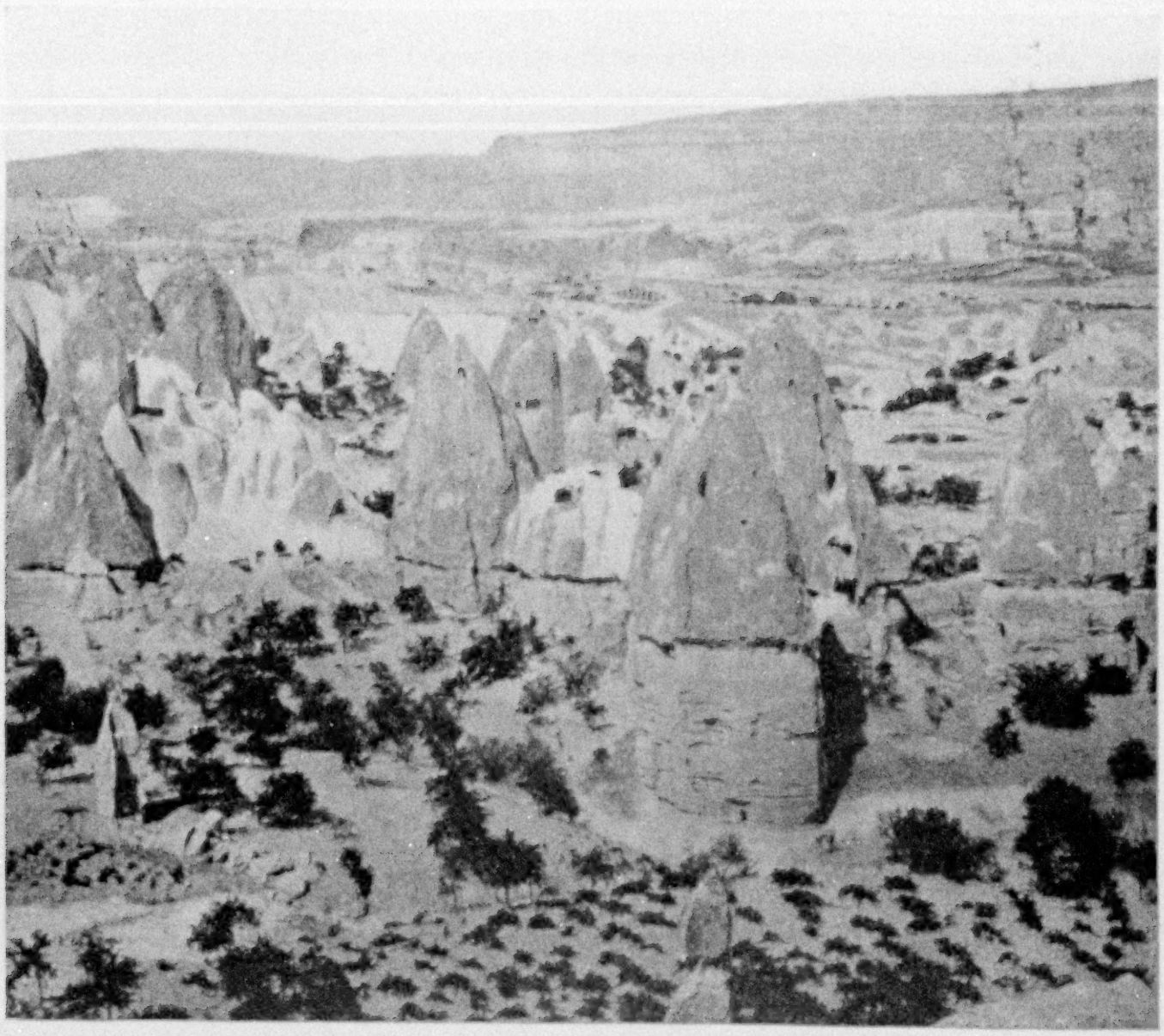
In the world in which primitive man lived, every man was the uncompromising foe of every other man; the man who lived in one den could have nothing in common with the man who lived in the neighboring den. A pale, or dead-line, was drawn between each several den, and the owner of den A was an outlaw if he crossed that dead-line into the territory of the owner of den B.

There were no rights of intermarriage; the den owner's woman was the captive of his spear; she was the slave of her captor. She bore him children, but the children and the mother alike remained the slaves of the lord of the den, who allowed them to share the abode with him. He fought for them with all the savage tenacity of the bulldog, the lion, or the tiger; and while he lived no other human being might enter that den and live to tell the tale.

TROGLODYTE TYPES OF ASIA MINOR

Several kinds of Troglodytes are still to be seen in various parts of Asia Minor. The most primitive type known to me is to be found in Cilicia Tracheia. They may be seen in many places, but they were thrust more particularly upon my attention in a pass in the Taurus Mountains some ten miles north of Ermenek (Germanicopolis).

The inhabitants of this valley, known as Bakluzan Dere, are cliff-dwellers of the secondary type—that is, they have done considerable work in the way of improving their abodes, whose entrances



HERE THE CAPS OF THE OBELISKS ASSUME GREAT PROPORTIONS AND THEY ARE EQUAL TO ONE-HALF OF THE ENTIRE HEIGHT OF THE OBELISKS

have been walled in with fences of stout masonry.

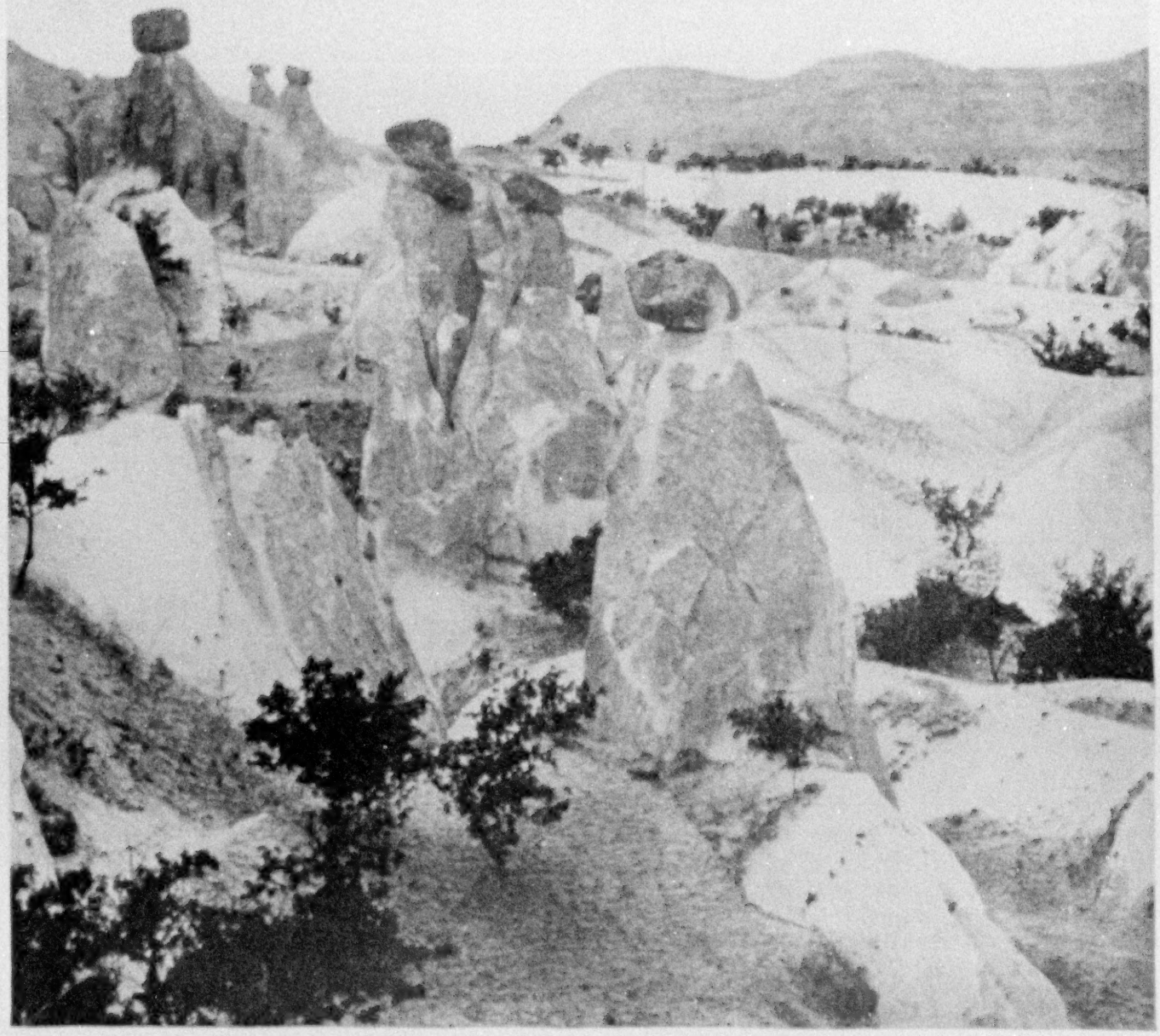
They have sought and found for themselves complete isolation. They seem to have none of the instincts of agricultural man and they are wholly inhospitable.

The entrances to their dwellings are high up in the almost perpendicular walls of the cliffs, and they are reached solely by means of long poles, which are light enough to be drawn up when the lord of the den and his family are safely housed. And when housed they really are safe from intrusion, for it would require a host to force an entrance against the will of the family. (For methods of ingress by other types of Troglodytes, see illustration on page 285.)

This very method of reaching the entrance by means of a pole makes it imperative for all the members of the several families of these cliff-dwelling Troglodytes to be strong and vigorous persons, for the sick, the aged, and the infirm can neither enter nor leave the dwelling, nor can they be brought in nor taken out by others, unless they be strapped to the back of a man, who would need to be not only strong, but very active as well.

A PRACTICE OF KILLING THE AGED AND INFIRM

One ancient writer tells us that some Troglodytes made a practice of killing all those who were not in first-rate physical condition, on the ground that a man who cannot earn his own living has no right to live; and when one sees these dwellings, one can imagine still another reason for killing off the aged and the infirm—



THE CONES DIMINISH IN HEIGHT AS THE RIM-ROCK OF THE BLUFF IS REACHED, FOR THERE THE CONES APPEAR IN THE PROCESS OF FORMATION

Notice here the lava caps on the cones. Originally every cone had a cap of lava, and indeed the protecting stratum of lava was the primary cause of the wearing away of the pumice-stone into the shape of cones.

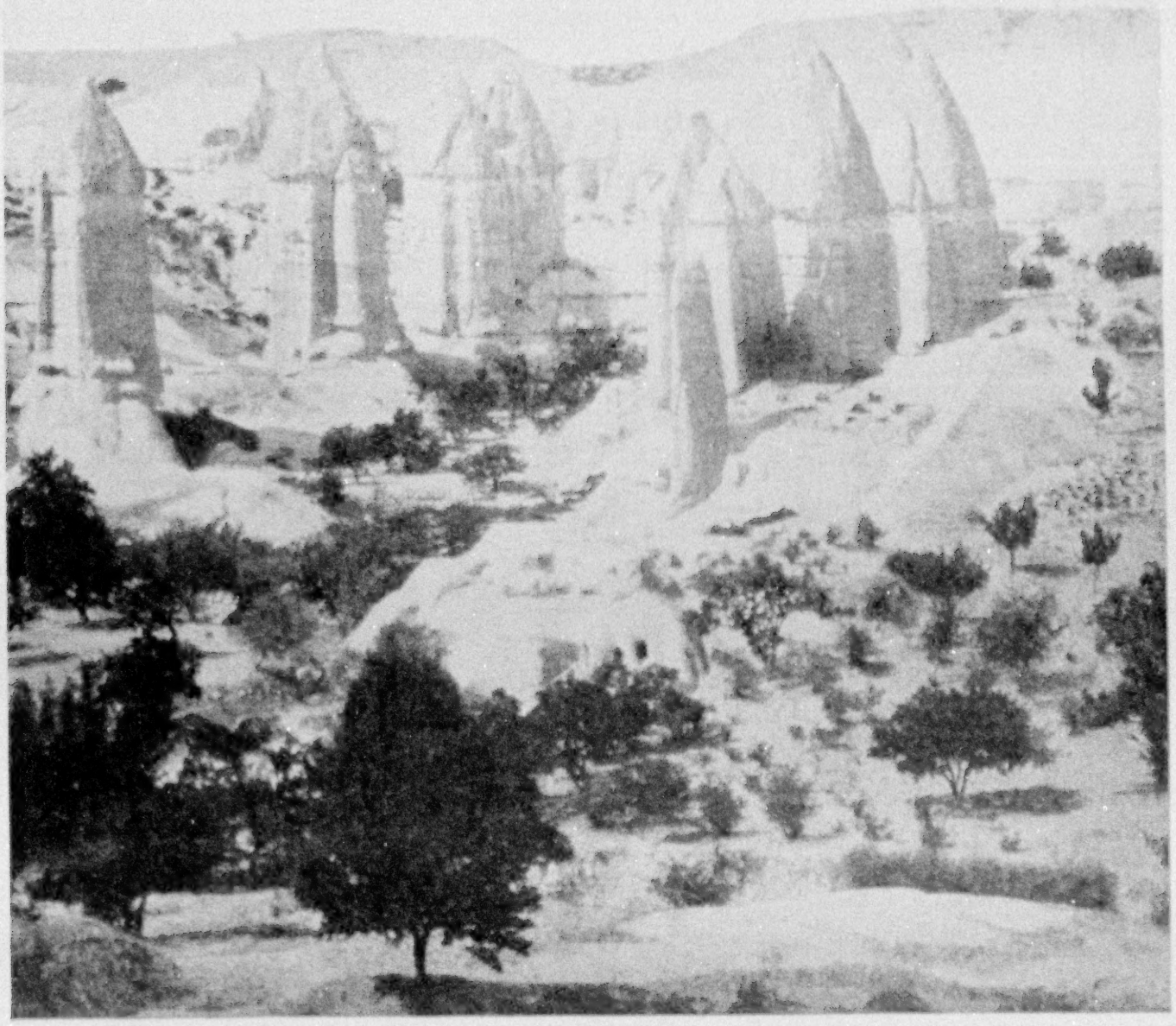
because of their inability to get in or out of the house.

The cliffs of the Bakluzan Dere are thickly studded with dwellings that give evidence of being inhabited by a large number of people, but I did not get a glimpse of any of them, nor was a single doorway open, though some of the entrance poles had not been pulled up.

Troglodytes, or semi-Troglodytes, of a ruder, but less inhospitable, type may be seen in many places in Lycaonia.

At Serai, north of Karaman, a stratum of rock lies upon a bed of clay, which, of course, may be excavated *ad infinitum* without very great labor, and the formation is made, as it were, for the Troglodytes. But the people who inhabit these abodes are not true Troglodytes, since they use them only during the long summer season.

The life there is most crude, and the cavities in the ground show no signs of having been improved by man. It is cer-



OFTEN THE CONES ARE NEARLY PERFECT IN SHAPE, BUT IN PLACES WHERE STRATIFICATION DISTURBED AND RESISTED THE EROSIVE PROCESSES THEY ARE SLENDER AND ASSUME THE GENERAL OUTLINES OF THE COLUMN OR OBELISK

But the obelisks have cone or sugar-loaf caps, or at all events they did have them originally. Here the caps are very large. The picture shows a stratified formation, which runs horizontally through all the obelisks; consequently in past ages, before erosion set in, all of these obelisks were united in one solid mass of pumice-stone. Here the huge caps are of harder material than that of which the underlying mass consists.

tain that the primitive Troglodytes lived in just such dwellings; but for all that, these people are not primitive at heart, for they have made no attempt to secure isolation. The element of fear of mankind is not present—that is, no kind of dead-line has been drawn against hostile neighbors.

XUM

THIS IS A DISTANT VIEW, BUT STILL IT SHOWS EXAMPLES OF CONES WITH DOORS OR HOLES OF INGRESS HIGH ABOVE THE GROUND

There are no visible finger-and-toe holes, as on page 285. They have merely rotted away in the course of the ages. The picture is otherwise interesting, as it shows us garden and desert lying side by side. The garden is easy to see, while the desert lies in the very foreground, where the bare pumice-stone is not disintegrated as yet.

A FEW OF THE 50,000 CONES NEAR UDJ ASSARÛ

The overlying stratum of lava, being harder than the pumice-stone, offered a longer resistance to the abrasive influences, and the result was the caps that appear on so many of the cones. One good specimen appears in this picture; they are seen frequently in other pictures.

The Greeks have left us accounts of engrossing interest concerning the Troglodytes of antiquity.

HOW THE TROGLODYTES LIVED 2,000 YEARS AGO

The Greek geographer and historian, Agatharchides, who flourished about 175 B. C., wrote a book on the region about the Red Sea. It was intended as a geography for his royal pupil, the heir to the throne of Egypt, who would find it to his interest to know as much as possible about his territories on the Red Sea and about the strange people who lived there. This book has perished, but about fifty pages of it were quoted by other writers whose works have survived to our times, and among other things they have preserved Agatharchides's account of the Troglodytes of the region of the Red Sea.

Here is the account as quoted by Diodorus Siculus:

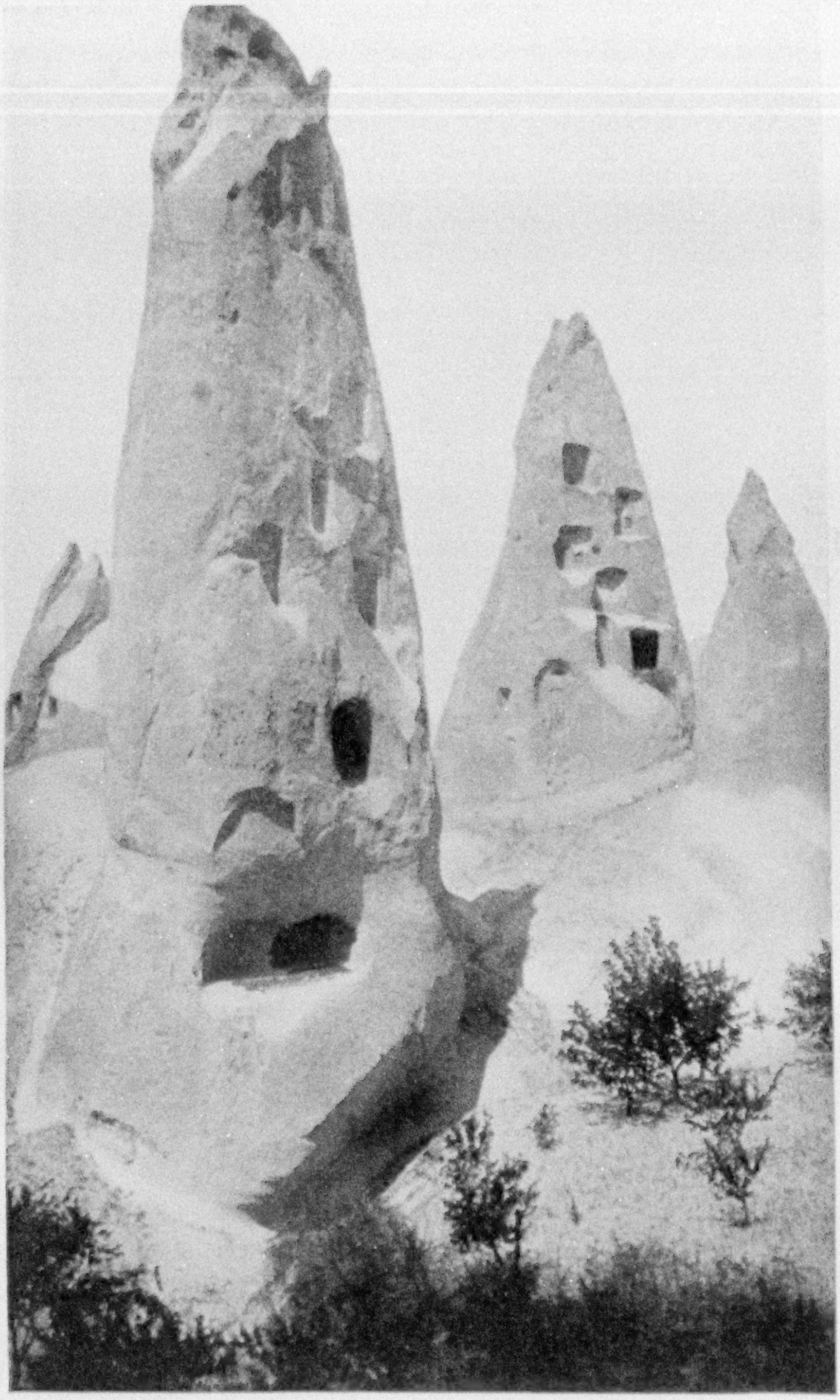
"The races that live in the extreme south have the form of men, it is true, but they lead the life of animals. These are the Ethiopians and the Troglodytes.

"The Troglodytes are called nomads by the Greeks. But though they do lead a nomadic life and gain their daily food from their flocks, nevertheless they have organized governments, at the head of which stand sheikhs who are clad with absolute power.

"They have their women and children in common, with the sole exception of the one woman who belongs to the sheikh. Should another man approach this woman, the sheikh exacts from him a fine consisting of a fixed number of sheep.

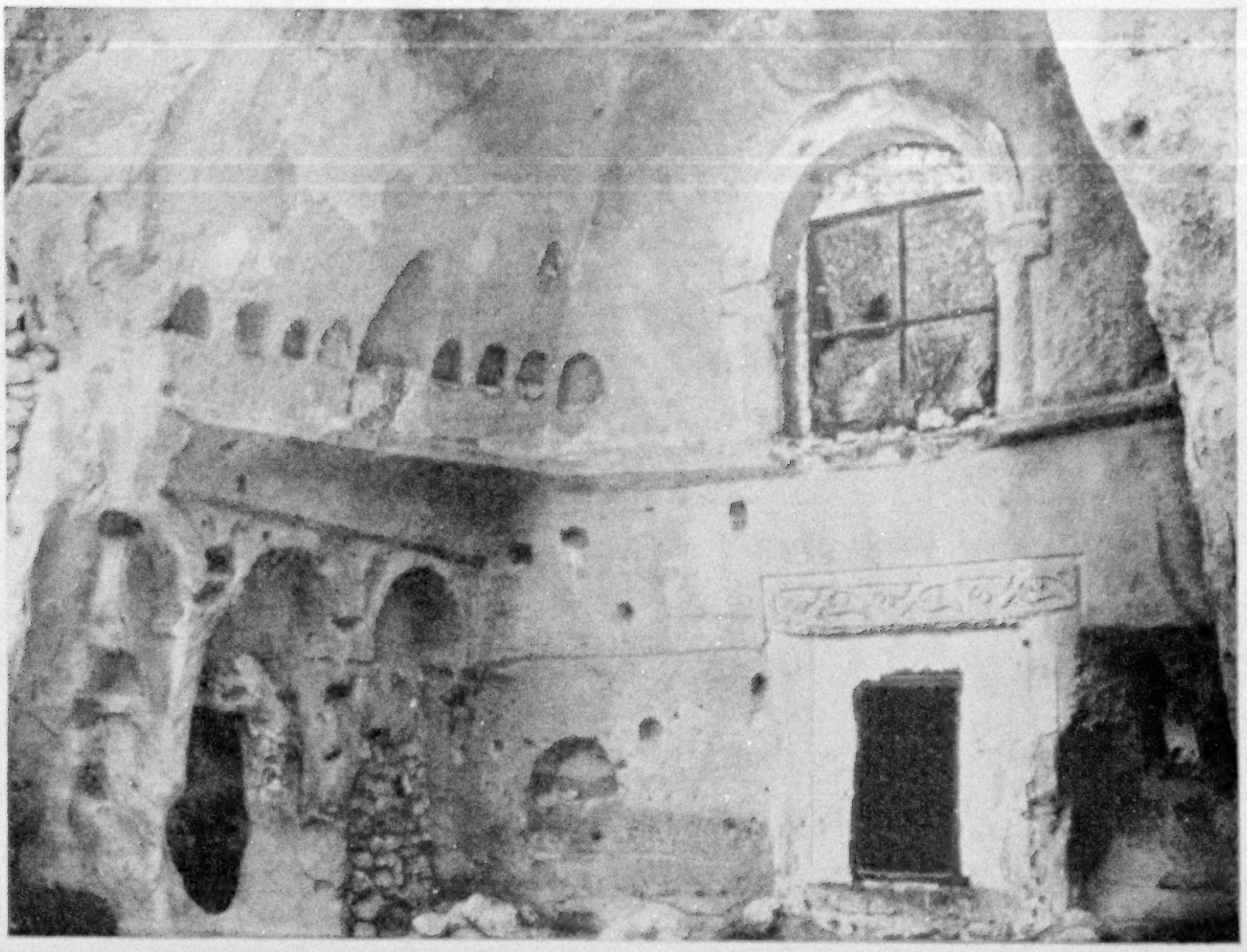
"THEIR FOOD A MIXTURE OF BLOOD AND MILK"

"When the great rains come upon them, at the time of the annual recurrence of the periodic monsoons, the Troglodytes



THE TALLEST CONES USUALLY STAND IN THE NEIGHBORHOOD OF THE CENTER OF THE ERODED VALLEYS, AS HERE

This tall cone is still inhabited and has about eight stories. Evidence of thrift is seen in the fruit spread out to dry in the sun on the floor of what was once an interior apartment. In the course of time its exterior wall has rotted away, leaving a great hole in the otherwise beautiful cone. The upper stories are given over to the pigeons, as may be seen from the windows that are now walled in. This is true of its neighboring cone also.



IF WE ENTER THE DOORWAY OF ANY OF THESE CONE-DWELLINGS, WE FIND OURSELVES IN A SPACIOUS CHAMBER, ABOUT WHOSE SIDES NICHES AND SHELVES FOR THE STORAGE OF HOUSEHOLD GOODS HAVE BEEN CUT INTO THE STONE

But something not in the original plans of the architect has happened in the case of this apartment; for in reality it consists of two chambers, one above the other. The floor of the upper chamber has broken away, owing to the fact that it was left too thin to support the weight demanded of it. Its outline may be traced easily. The stairways to the upper stories are like wells or chimneys. They had no stairs, as we understand stairs, and one mounted to an upper story by means of finger-and-toe holes precisely like those which gave access to the front entrance. Some of these cones have as many as nine stories, but most of them have only two, three, or four stories. One can easily count the stories from the outside by means of the windows.

live upon a mixture of blood and milk, which they first boil separately for a time and then stir in together. After these annual rains, when the pasture grounds have become parched by the excessive heat, they migrate to the marshy places, where they fight with each other for the possession of the pasture grounds.

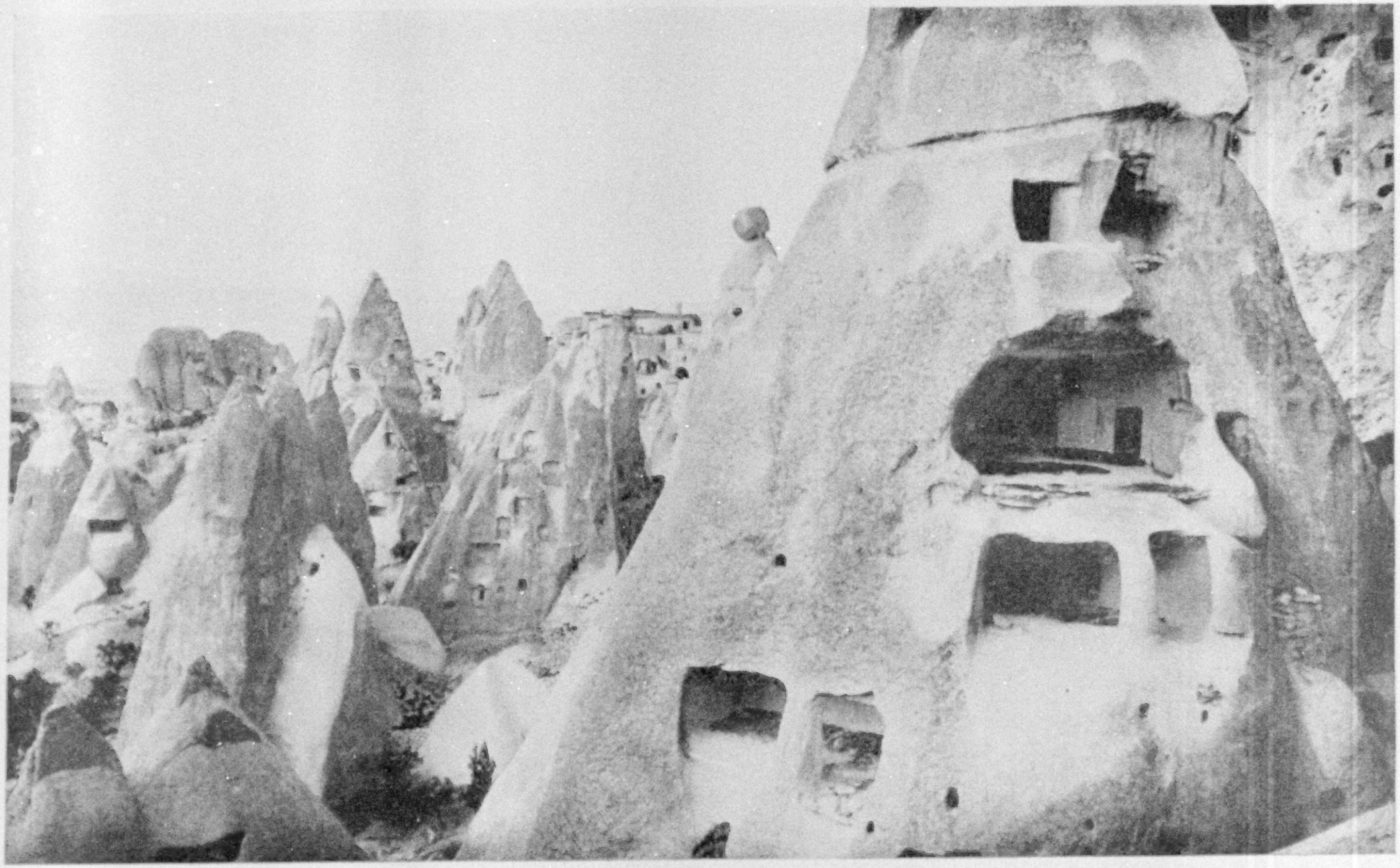
"They use for food only the old animals and those that begin to grow sickly. It is for this reason that they do not apply the name of parent to human beings, but to bulls and cows, to rams and sheep. These they call their fathers and their mothers, because these animals, and not the persons who begat and bore them, furnish them with their daily food.

"Private individuals use as a beverage a decoction made from the thornbush, but from some flower or other they make for the sheikhs a drink that resembles the meanest kind of must known in Greece.

"They migrate with their herds from pasture to pasture, and they avoid long residence in one place. They wear a clout about their loins, but otherwise they go nude. All the Troglodytes practice circumcision, as do the Egyptians; but those among them who from a misfortune are said to be 'stunted' and have had their privy parts shorn away with a razor when they were still infants, pasture the country that lies between the Straits.

"Those of the Troglodytes who are

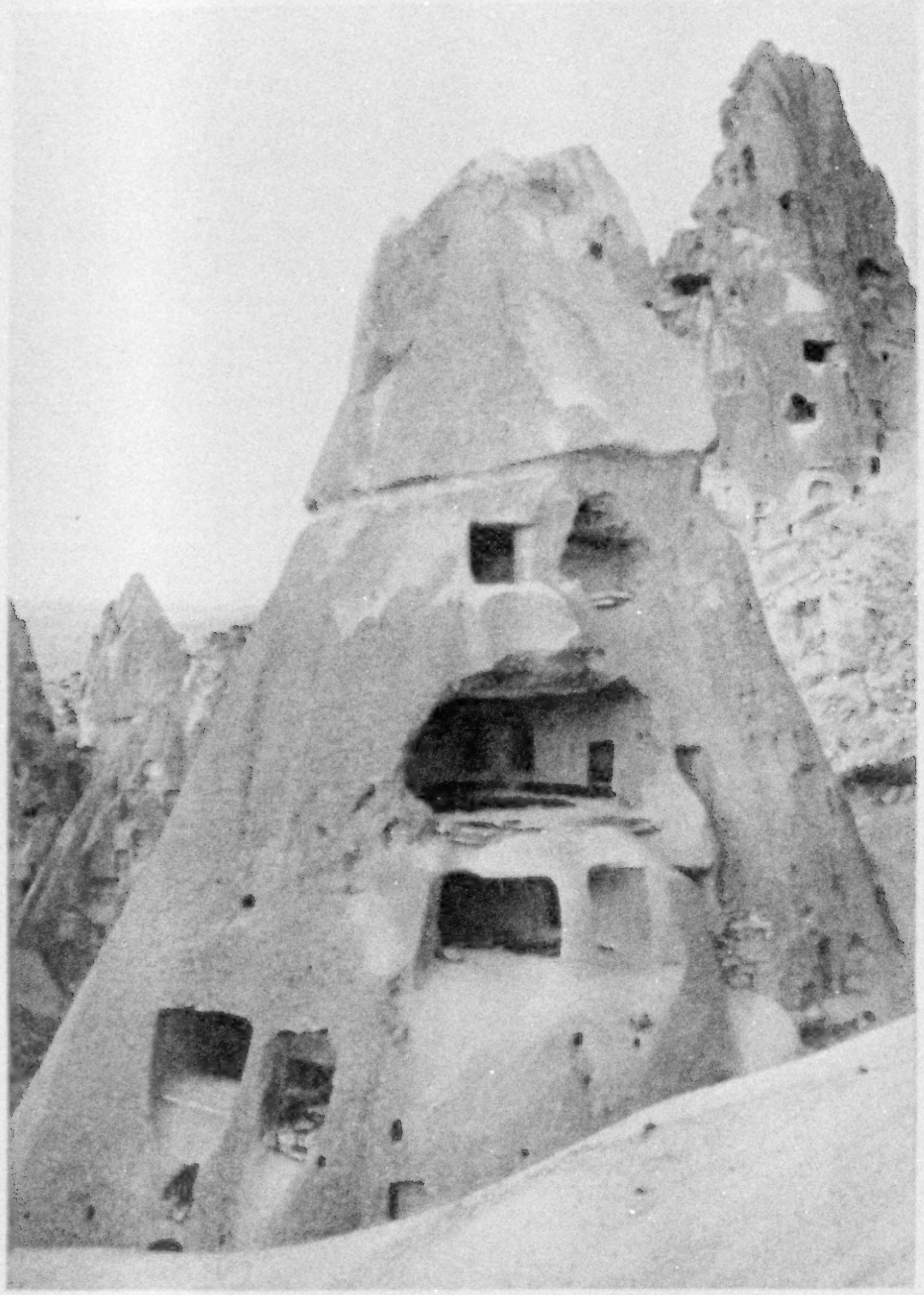
XUM



THE SMALLER CONES IN THE CENTER OF THE PICTURE ARE GRANARIES AND PIGEON-HOUSES

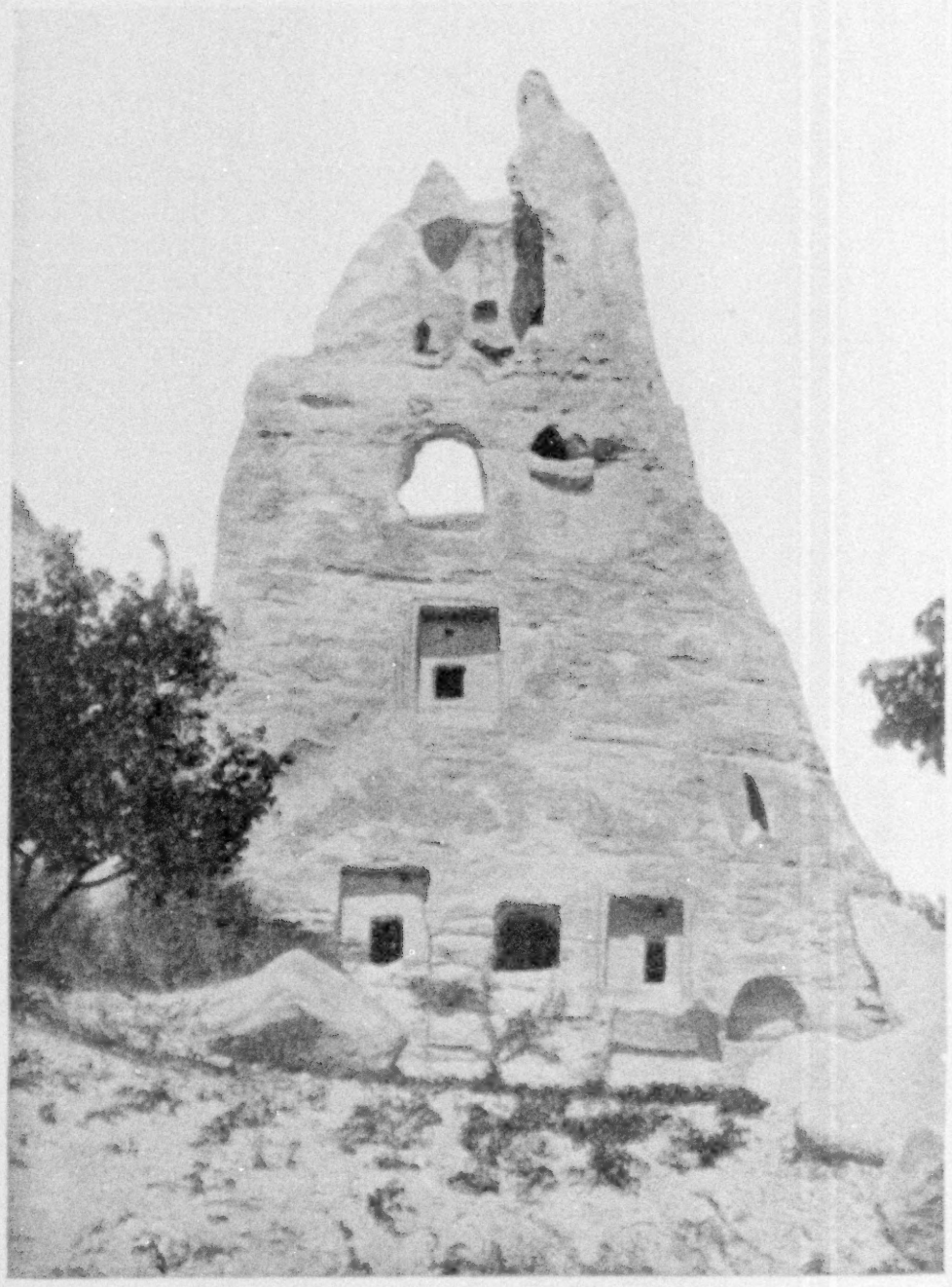
On the left of them are three engaged cones with a wedge-shaped annex which has a door near the top of the wedge. Finger-and-toe holes lead to this door. These three cones are at present a granary, from which came the barley that fed the animals in the author's caravan. It was brought out of the one hole on the backs of men, just as it had been carried in on their backs. Such a granary is comparatively free from the visitation of thieves. Notice the cap on one of the cones. Here, as in many other cases, the cap could not maintain its position on the tiptop of the cone but for the fact that it forms one integral conglomerate mass with the cone. Note the fruit drying in the apertures at the right.

XUM



IN MANY CONES THE EXTERNAL WALLS THEMSELVES HAVE ROTTED AWAY, LEAVING THE CHAMBERS EXPOSED

Such exposed chambers, if they have the proper exposure, are utilized today for drying grapes, apricots, and other fruit; for, by reason of their lofty location, they defy invasion on the part of disreputable animals in the shape of dogs, cats, chickens. Here one can see the drying fruit on the floors of three stories, near Udj Assarü.

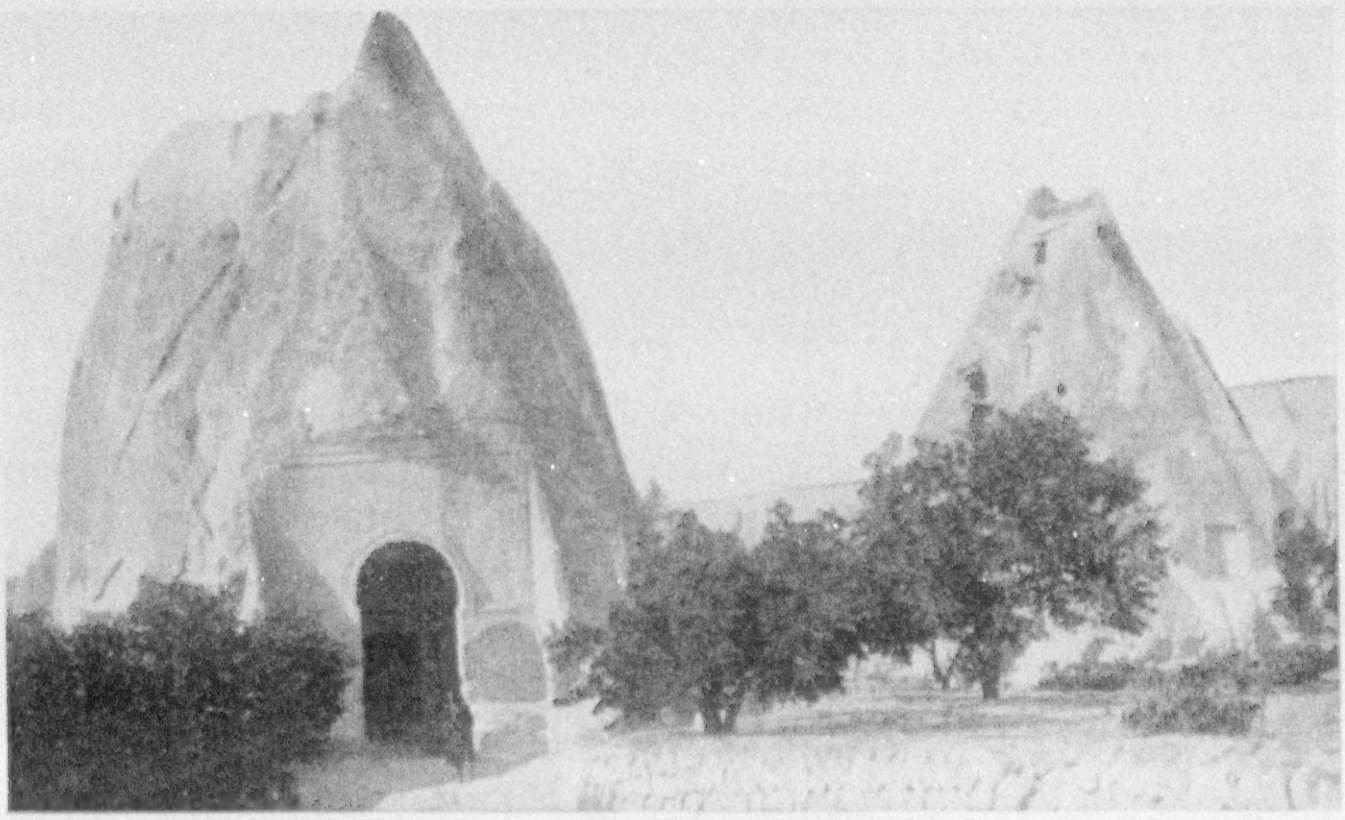


THIS FIVE-STORY CONE-DWELLING WAS A FOUR-FAMILY FLAT

The three doorways on the ground floor and still a fourth doorway in the third story (to which access was had by means of the usual finger-and-toe holes shown on page 285) show that at least four families were sheltered by the friendly cone before its side walls disintegrated.

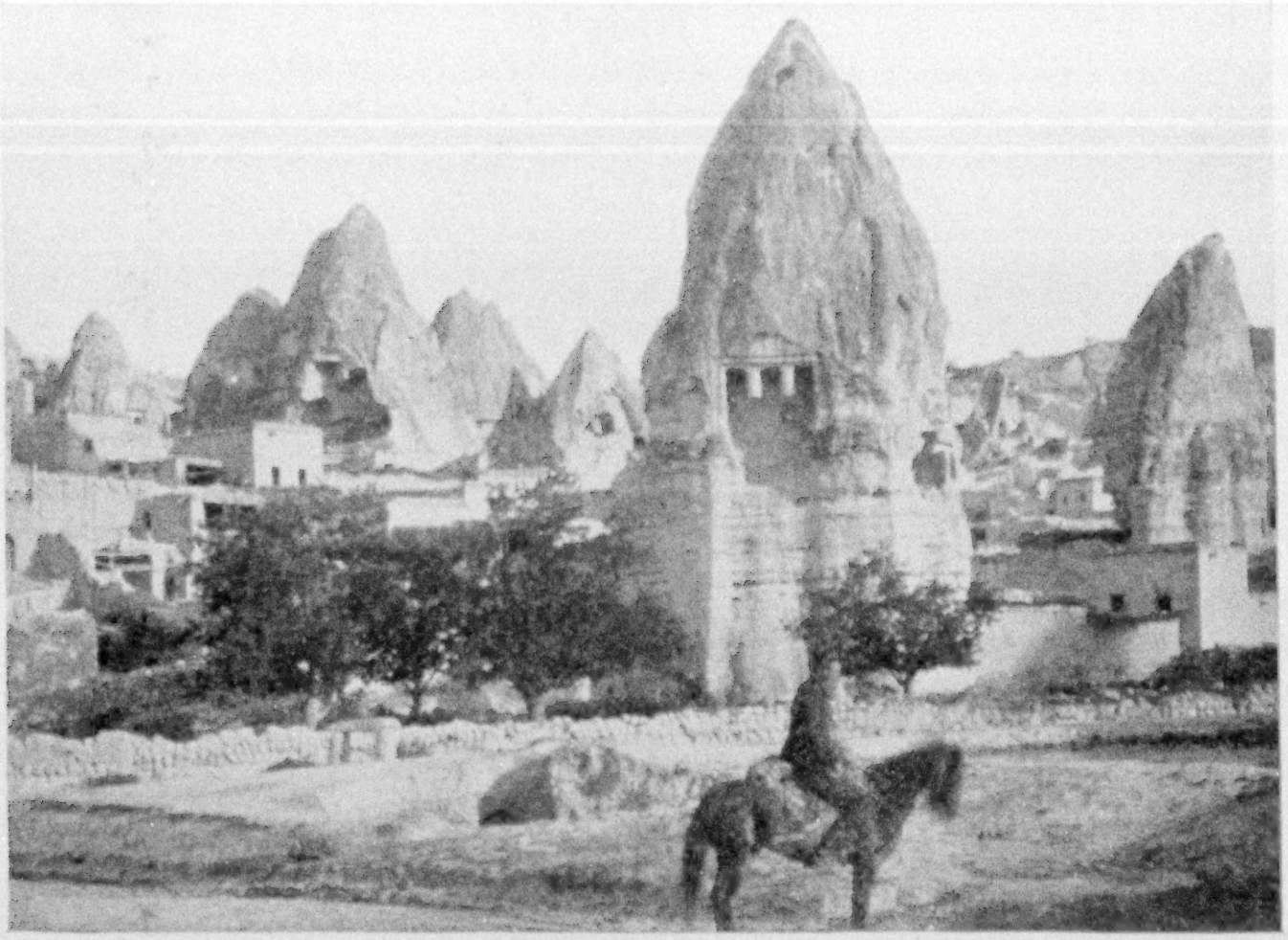
THIS IS A GREEK TEMPLE WITH COLUMNED PORTICO AND NO VISIBLE MEANS OF INGRESS

But the badly weathered and forlorn appearance of the cone tells us that disintegration has disfigured it greatly. Still its great cap of lava will protect it for many centuries yet to come.



THE FACADE, DOORWAY, AND VESTIBULE OF THIS CHURCH ARE STILL WELL PRESERVED

The door leading from the vestibule into the church proper may be distinguished in the dark background. The cone on the right also has a good doorway.



THERE IS NO VISIBLE MEANS OF INGRESS TO THIS TEMPLE, WITH ITS COLUMNED PORTICO AND BROKEN COLUMNS: THE VILLAGE OF MARTCHAN
(SEE ALSO PAGES 308-309)

The absence of means of ingress is only apparent; for, as the disintegration of the stone is going on all the while, the cones are necessarily growing smaller, and the original finger-and-toe holes have simply rotted away.

said to be heavy-armed wear circular shields made of raw ox-hide and carry clubs that are decorated with iron-plated knobs; but the rest of them use bows and spears.

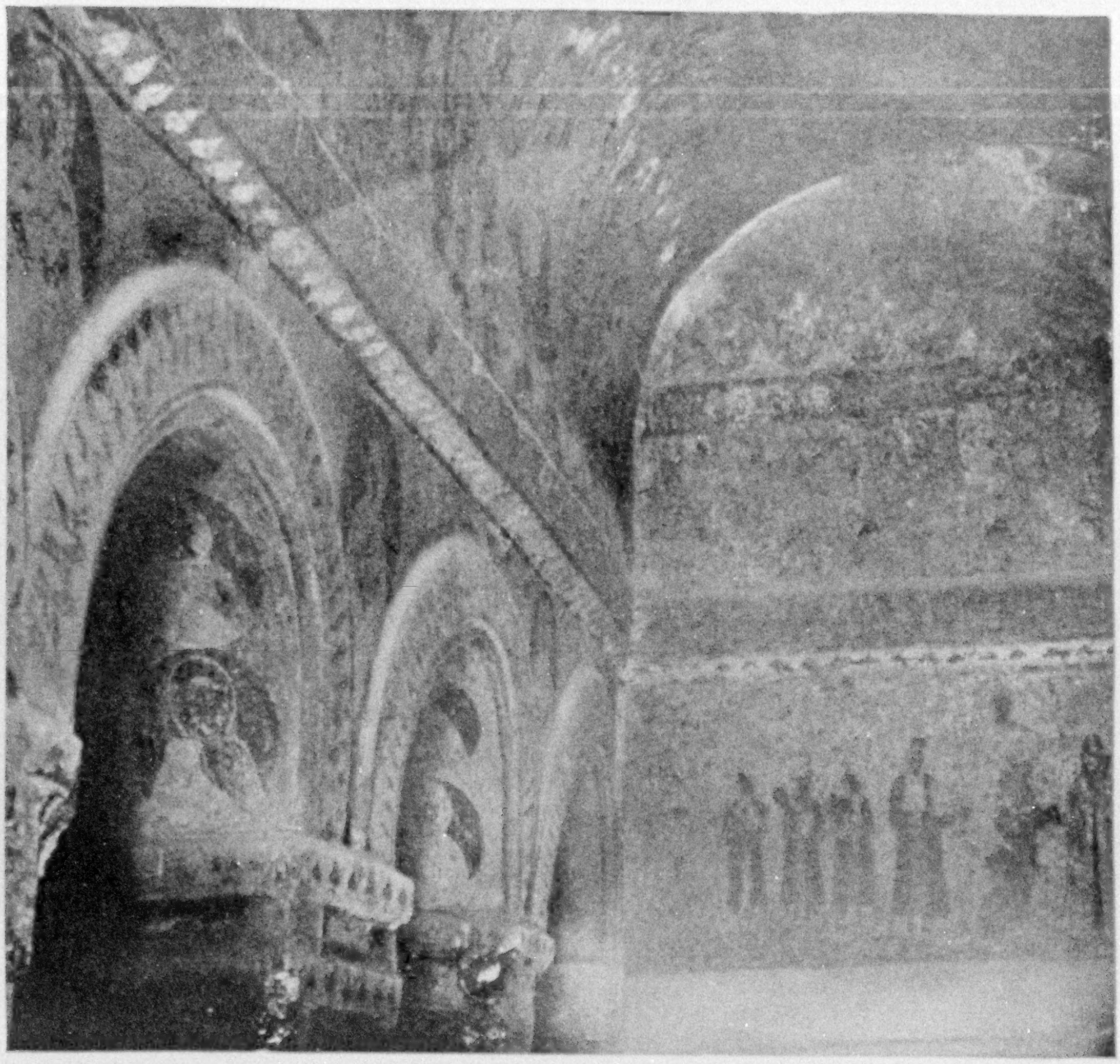
MUCH MERRYMAKING AT TROGLODYTE FUNERALS

"Their mode of burial is very singular. They bind together the neck and the knees of the dead person with withes made from the thornbush; then they carry the corpse thus bound up to a place at some distance from the camp, where with laughter and with merriment they hurl upon it stones as large as they can hold in their hands, until they succeed in covering and concealing the body with the stones. As the final ceremony they place a goat's horn upon the heap, and then go to their several homes without the display of the slightest kindly feeling.

"They do not fight, as the Greeks do, about land or about accusations which some one has made against them, but they do fight about the various pasture grounds which from time to time succeed each other according to the season. In these fights they begin by hurling stones at each other; then, after some of them have been wounded, they betake them to their bows and arrows. Many of them are soon killed, because they are experts in the use of these weapons and they shoot accurately, and moreover the men at whom they shoot are unprotected by defensive armor.

"Eventually the old women throw themselves into the midst of the fray, and as they are held in great reverence, they soon put an end to the fights. For a custom prevails among the Troglodytes which forbids them to strike a woman under any circumstances whatsoever, and in consequence of this custom the fighting ceases as soon as the women appear upon the scene.

XUM



THE INTERIOR OF MANY OF THE CHURCHES ARE STILL COVERED WITH FRESCOES, WHICH, HOWEVER, ARE MORE OR LESS OBLITERATED

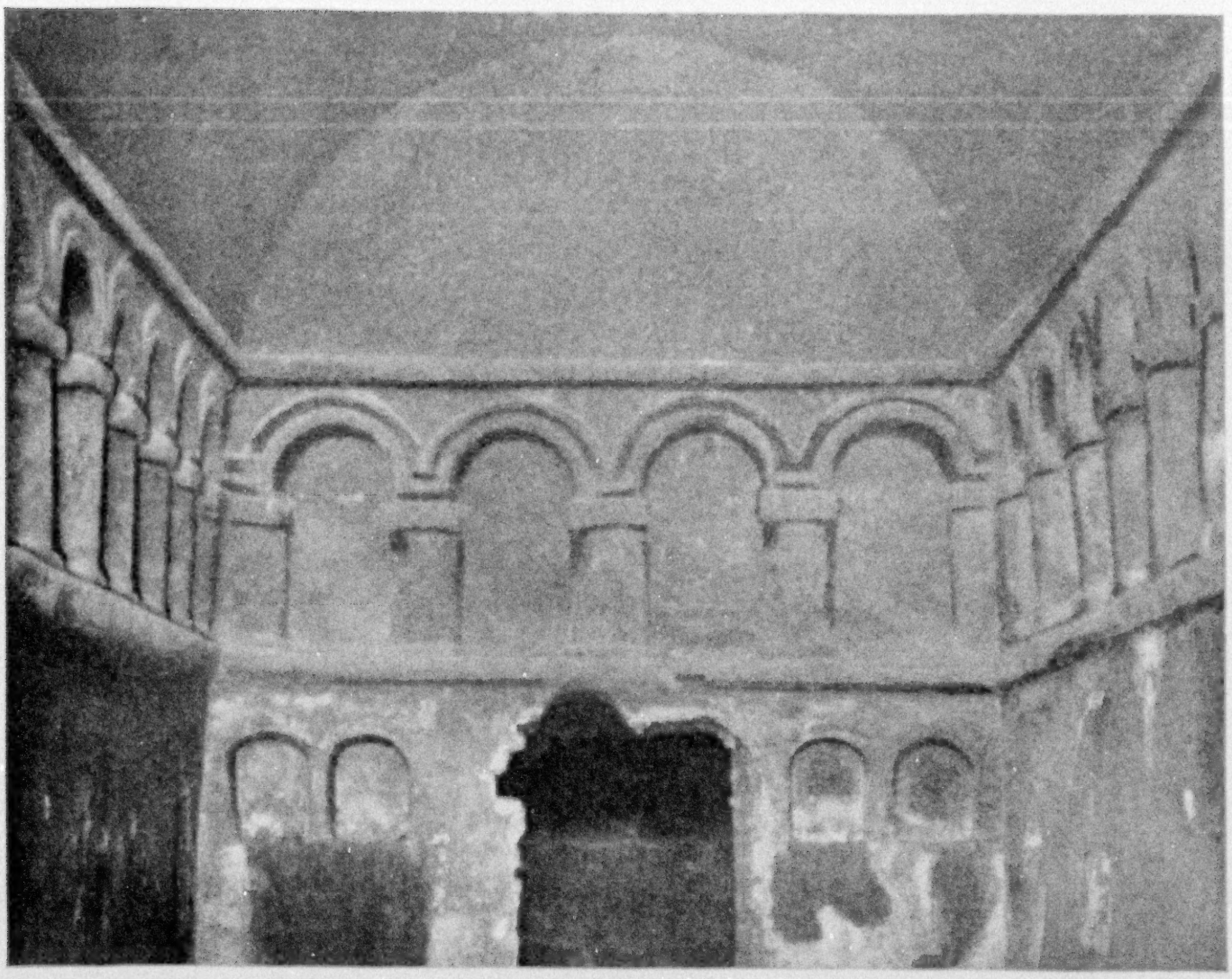
Among them we find portraits not merely of Greek saints, but traces even of pretentious paintings. In this photograph we see specimens of such mural paintings. Those who are familiar with Byzantine sacred painting will be able to detect a number of portraits of saints by means of the nimbus. The characteristic Byzantine columns and arches will also be noticed. In some cases the paintings are in very ancient style, while others are evidently more recent.

"The old men, who on account of their age are no longer able to follow the flocks, tie the tail of a bull round their necks and thus commit suicide by suffering themselves to be dragged to death. But, under the pretense of kindly solicitude, any one who wishes to do so may place a rope about the neck of the man who unduly postpones his suicide, and so by means of this pointed reminder he is forced to leave this life.

"It is also their practice to put to death cripples and those who are afflicted with an incurable disease, for they maintain that the love of life is inexcusable in the man who can do nothing to justify his continuance in life. That is the reason why all Troglodytes are sound in body and are mostly in the prime of life; for men of more than sixty years of age are not seen among them."

Strabo mentions some further details which he quotes from Artemidorus:

"The food of the Troglodytes consists



THE INTERIOR WALLS OF THE CHURCHES SHOW CHARACTERISTIC BYZANTINE ARCHITECTURE, OR RATHER THE IMITATION OF BYZANTINE ARCHITECTURE

It was by no means easy to secure photographs of these interiors.

of meat and bones; the bones are crushed and mixed with the meat, so as to form a kind of minced hash, which is wrapped in fresh, untanned hides and roasted. This minced haggis is prepared in a variety of ways by the cooks, whom they regard as unclean persons. They consume not merely the minced meat of this haggis, but the bones and the skin as well."

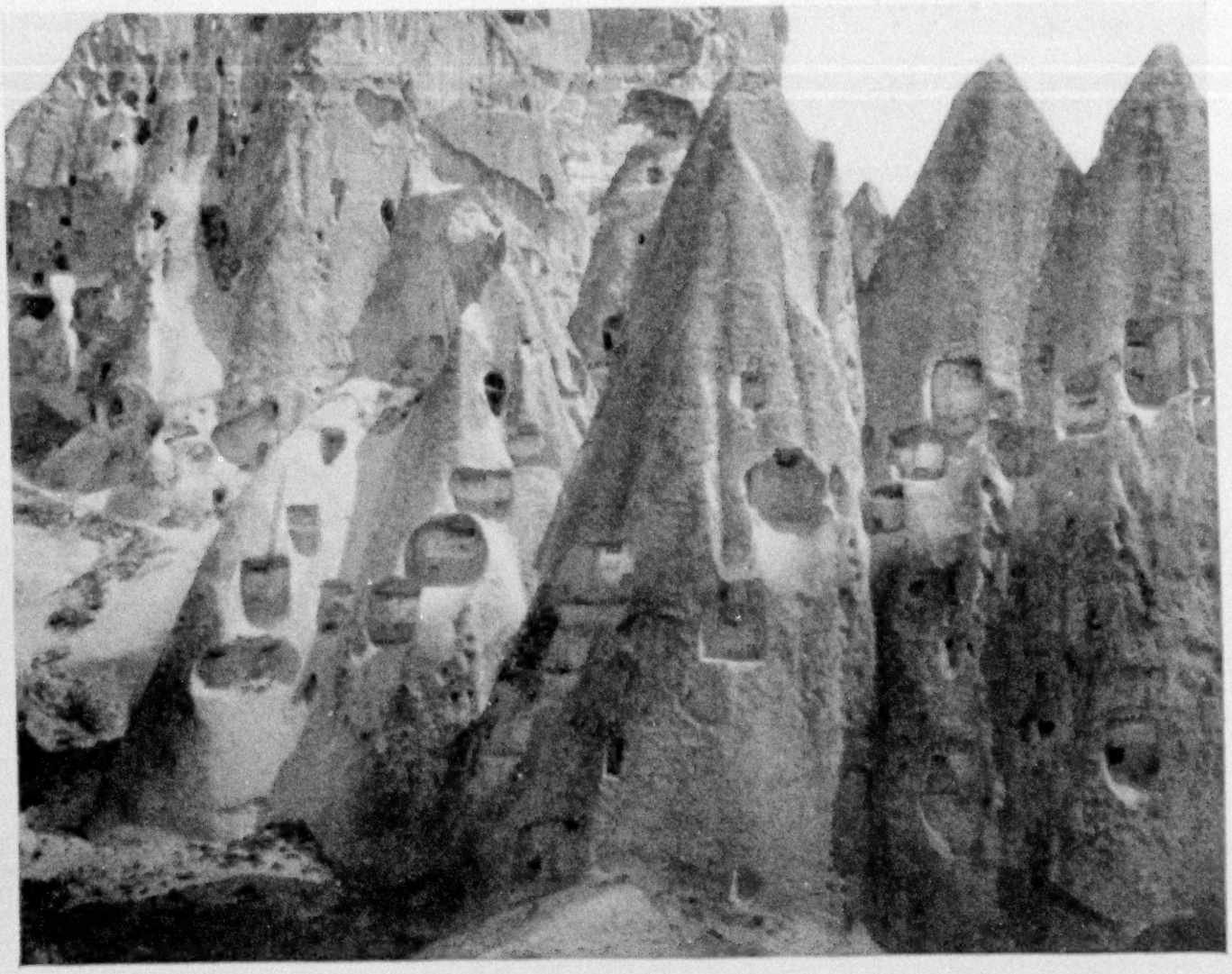
HERODOTUS WROTE OF "ETHIOPIANS WHO DWELL IN HOLES"

Herodotus's account of "the Ethiopians who dwell in holes" informs us that, "Of all the nations of whom any account has reached my ears they are by far the swiftest of foot. They feed on serpents, lizards, and other similar reptiles. Their language is unlike that of any other people; it sounds like the screeching of bats."

These Troglodytes have been identified with the Tibboos of Fezzan. The historian's criticism of their language was a typically Greek view to take, for the Greeks knew only their own tongue and they were conceited enough to believe that those who did not speak it simply did not speak at all, but either screeched like bats or twittered like birds.

On the other hand, Xenophon gives us a delightful picture of the Troglodytes of Armenia, who have remained so unchanged throughout the centuries that his description might be used of them at this present moment. He says:

"It was here that Polycrates, an Athenian and captain of a company, asked for leave of absence; he wished to be off on a quest of his own; and, putting himself at the head of the active men of the



GREAT NUMBERS OF THE CONE-DWELLINGS ARE NOW USED AS DOVECOTES FOR THE HOUSING OF THE FLOCKS OF PIGEONS THAT GIVE BOTH THEIR EGGS AND THEIR FLESH TO THEIR TROGLODYTE OWNERS

The windows of such hen-coop cones are always walled in, though holes of ingress and egress are left for the birds. These cones are usually painted red or white on the outside of the holes as far as the arm can reach. The reason for this practice is not apparent, unless it is that the pigeons are thus supposed to be aided in locating their abodes.

division, he ran to the village which had been allotted to Xenophon.

"He surprised within it the villagers, with their headman and seventeen young horses which were being reared as a tribute for the king, and, last of all, the headman's own daughter, a young bride, only eight days wed. Her husband had gone off to chase hares, and so he escaped being taken with the other villagers.

"The houses were underground structures, with an aperture like the mouth of a well, by which to enter, but they were broad and spacious below. The entrance for the beasts of burden was dug out, but the human occupants descended by a ladder.

"In these dwellings were to be found goats and sheep and cattle, and cocks and hens, with their various progeny. The flocks and herds were all reared under cover upon green food.

XENOPHON'S VISIT TO THE DWELLERS UNDERGROUND

"There were stores within of wheat and barley and vegetables, and wine made from barley in huge bowls; the grains of barley malt lay floating in the beverage up to the lip of the vessel, and reeds lay in them, some longer, some shorter, without joints. When you were thirsty you took one of these in your mouth and sucked. The beverage without admixture of water was very strong, and of a

DISINTEGRATION OF THE EXTERIOR WALLS IS FAR ADVANCED IN THIS ORIGINALLY SPLENDID CONE, WITH ITS CAP STILL IN POSITION

This photograph was selected by Perrot as typical of the whole series, and it appears in his History of Hittite Art.

delicious flavor to certain palates, but the taste must be acquired.

"Xenophon made the headman of the village his guest at supper and bade him keep a good heart. So far from robbing him of his children, the native was assured that the Greeks would fill his house full of good things in return for what they took before they went away; only the headman must set them an example and discover some blessing or other for the army until they found themselves with another tribe.

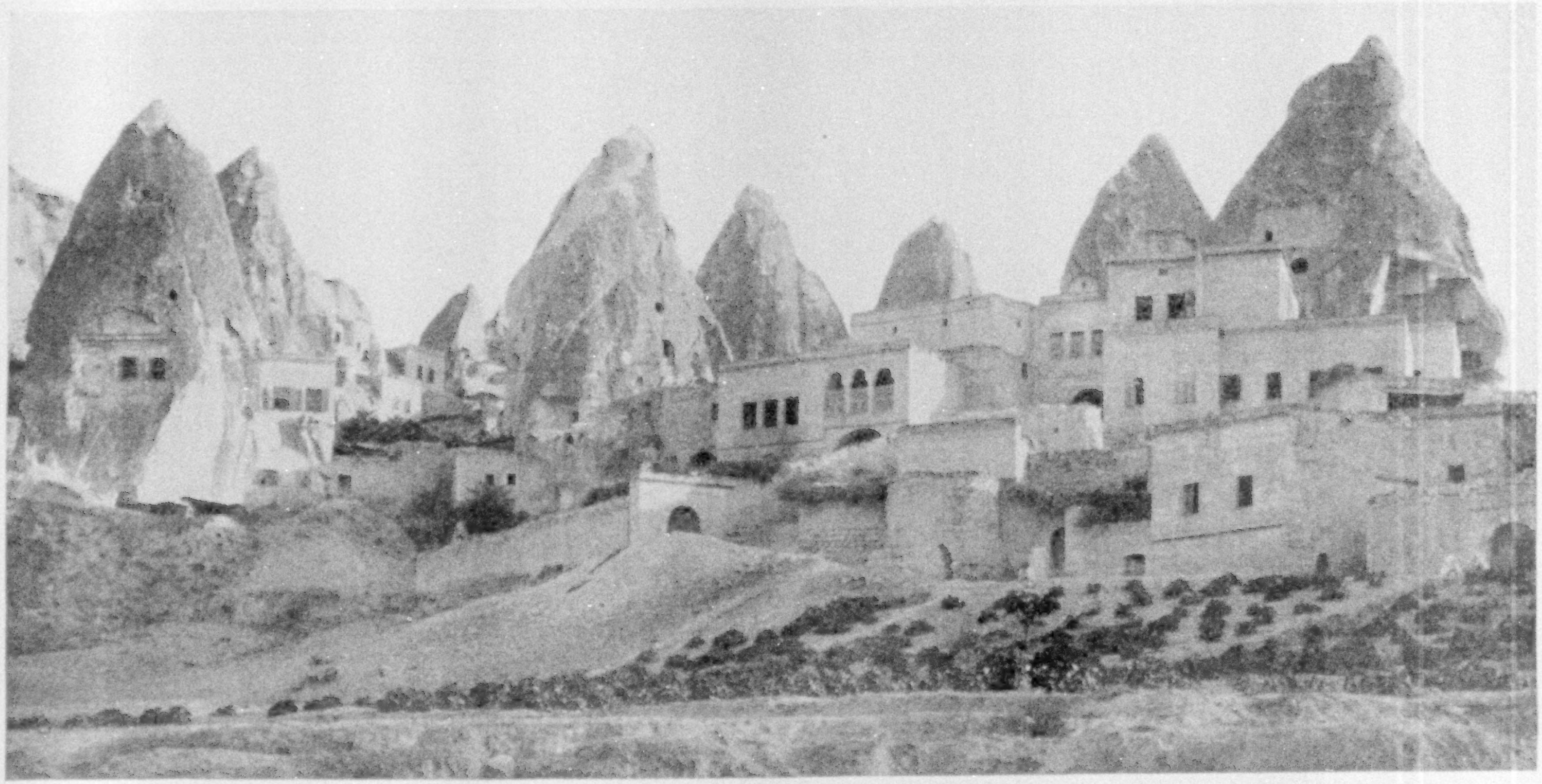
"To this the headman readily assented, and with the utmost cordiality showed the Greeks the cellar where the wine was buried. For this night, then, having taken up their several quarters as described, they slumbered in the midst of plenty, one and all, with the headman under watch and ward and his children with him safe in sight.

"On the following day Xenophon took the headman and set off to Cheirisophus, making a round of the villages, and at each place faring sumptuously and merry-making. There was not a single village where the inhabitants did not insist on setting a breakfast before the visitors, and on the same table were spread half

A VINEYARD GROWS ON THE ROOF OF THIS MAN'S HOUSE

The landscapes amid which the modern Cappadocian Troglodyte loves to dwell are varied to infinity and they are never tame; nay, they are always fascinating, and oftentimes even uncanny and startling. The modern Troglodytic usages add to, rather than detract from, the general weirdness of the landscape. In the foreground of this picture we see an instance of a man's vineyard lying, apparently, on the top of his house. Note also the threshing-floor in foreground. This is the village of Martchan (see pages 303 and 309), and Udj Assarü (see page 286) is seen on the horizon and many cones in the background.

XUM



THE NATIVES OF THIS REGION ARE STILL TROGLODYTES: VILLAGE OF MARTCHAN (SEE ALSO PAGES 303, 308)

But if we leave out of consideration the fact that their dwellings are at least partially underground, they differ in habits and customs in no whit from the ordinary Turkish villagers with ordinary humdrum surroundings. Frequently the front, or façade, of the house alone is constructed from blocks of the easily quarried pumice-stone, while all the rest of the abode is subterranean. This fact is well illustrated by this photograph (see also pages 314, 315). What appear to be complete houses here are really only façades. On the left one can see that the great cone (originally a Greek temple, as the gable indicates) forms one house with the builded annex.

THE USE OF THE CONES AS THE REAR AND REAL STOREHOUSE OF MODERN BUILDED FRONTS IS QUITE COMMON

On the extreme left is a fine old cone which has been utilized in that way. This cone is habitable to its very top. Note the group on the right.

THIS IS NOT A TRUNCATED CONE

The photograph was taken for the sake of the details, and the top of the cone and of the cliff lie outside the field of the camera. On the left it is easy to see that the great cone is the real habitation. We notice here the first example of an actual stairway; it is modern. On the right the rock has rotted away, leaving a great chamber exposed. Inside this chamber an enterprising modern Troglodyte has built the façade of his house, which, as one can easily see, fills only about one-half of the original chamber in which the Troglodyte of antiquity lived. Note cart wheels on right (see pages 322, 323).

a dozen dishes at least—lamb, kid, pork, veal, fowls, with various sorts of bread, some of wheat and some of barley.

DRINKING A GUEST'S HEALTH FROM THE COMMON BOWL

"When, as an act of courtesy, any one wished to drink his neighbor's health, he would drag him to the big bowl, and when there he must duck his head and take a long pull, drinking like an ox. The headman, they insisted everywhere, must accept as a present whatever he liked to have. But he would accept nothing, except where he espied any of his relations, when he made a point of taking them off, him or her, with himself.

"When they reached Cheirisophus there was a similar scene. There, too, the men were feasting in their quarters, garlanded with wisps of hay and dry grass, and Armenian boys were playing the part of waiters in barbaric costumes, only the feasters had to indicate by gesture to the boys what they were to do, as if they were deaf and dumb.

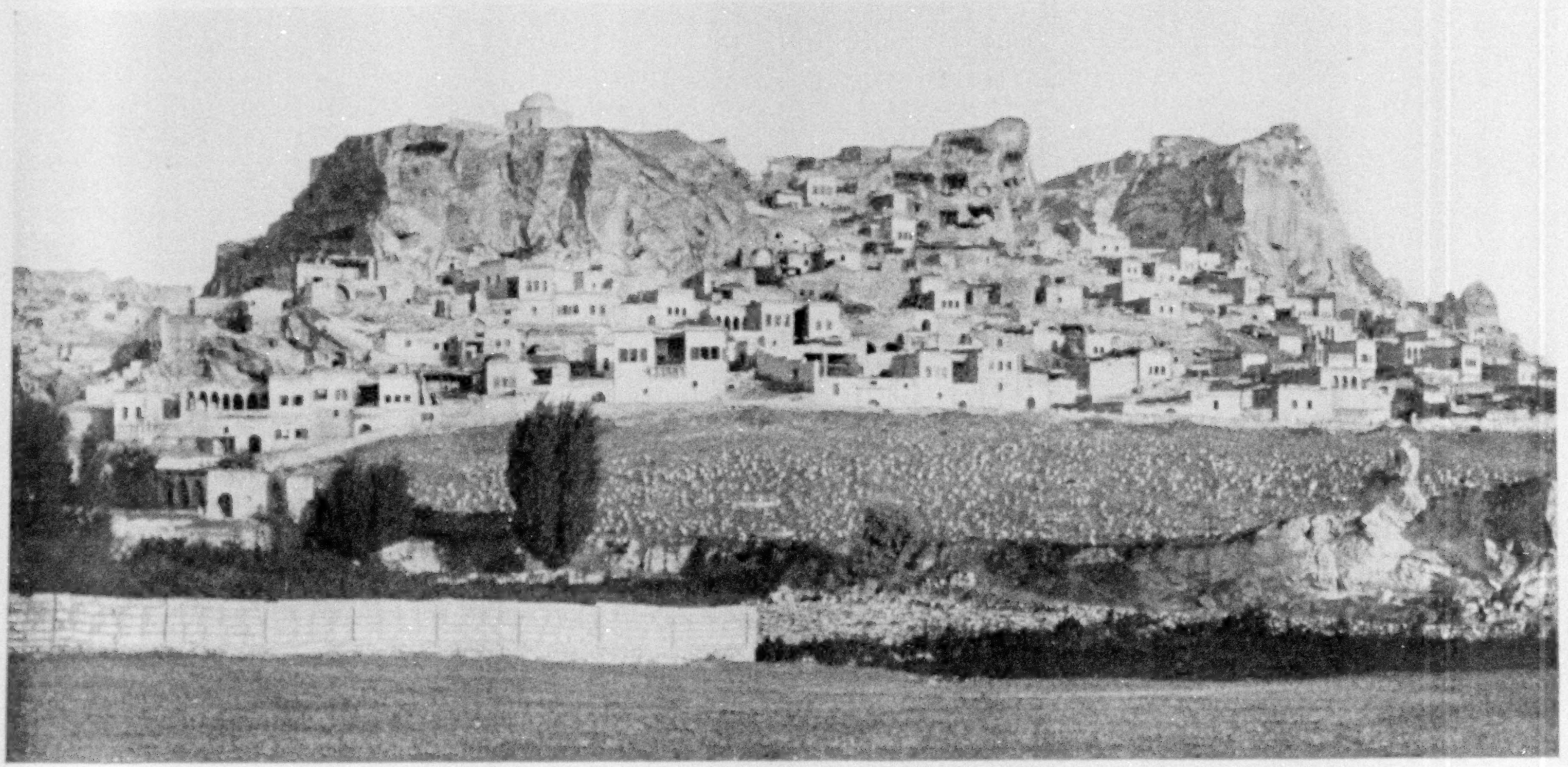
"After the first formalities, when Cheirisophus and Xenophon had greeted one another like bosom friends, they interrogated the headman in common by means of the Persian-speaking interpreter.

" 'What was the country?' they asked. He replied, 'Armenia.' And again, 'For whom are the horses being bred?' 'They are tribute for the king,' he replied. 'And the neighboring country?' 'Is the land of the Chalybes,' he said, and he described the road which led to it.

"So for the present Xenophon went off, taking the headman back with him to his household and friends.

"The horses in this country are smaller than the Persian horses, but are more

XUM



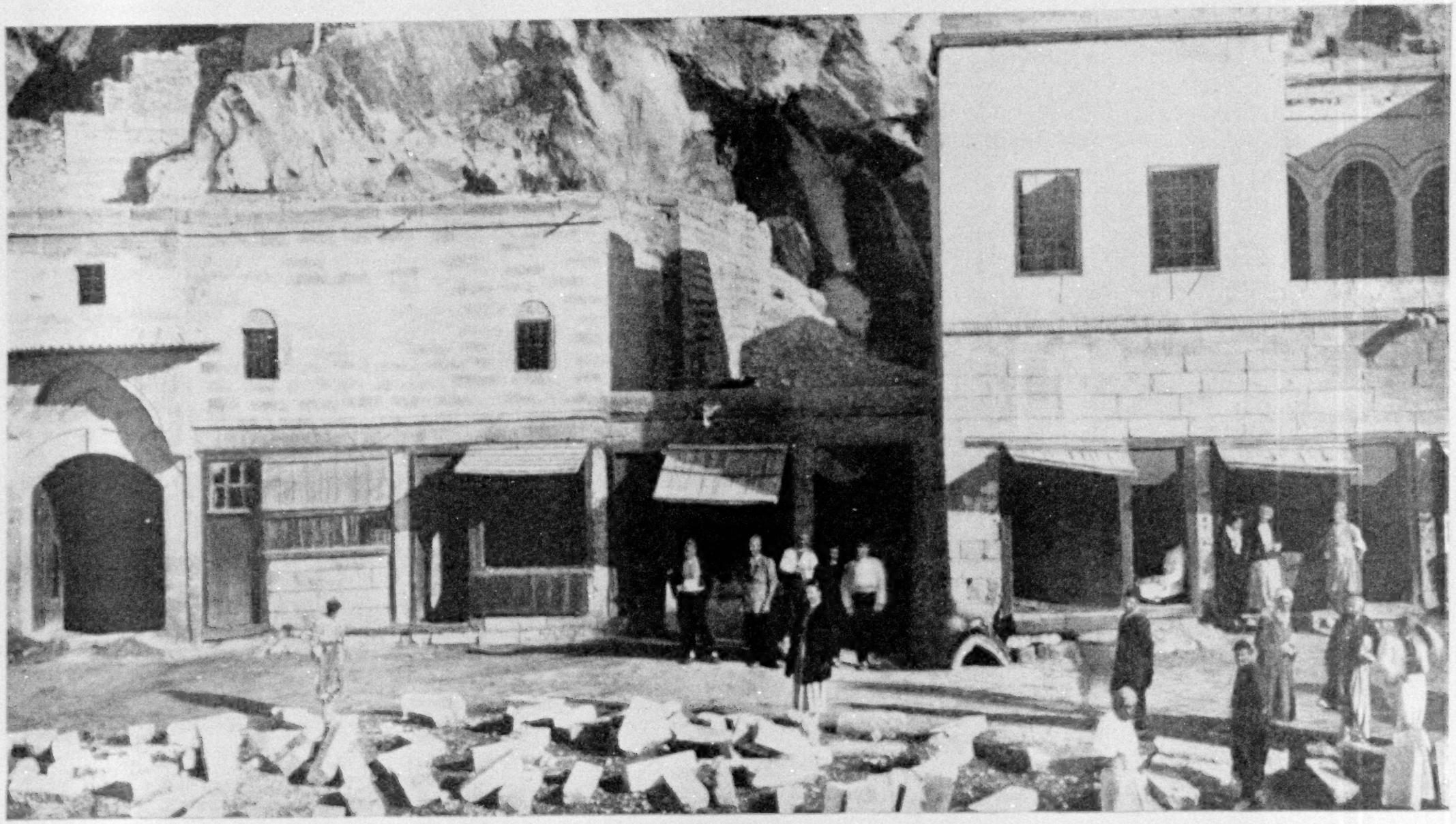
THIS PHOTOGRAPH GIVES A GENERAL VIEW OF THE VILLAGE OF URGÜB, FROM WHICH THE TWO PANORAMIC STREET SCENES ON PAGES 314 AND 315 WERE TAKEN

The village is built around one of those great pumice boulders, or hummocks, of which several specimens are shown on pages 324-327. Most, if not all, of the houses seen here are mere façades giving entrance to the chambers, which extend horizontally into the bowels of the earth. The house façades are all built of quarried pumice-stone. The top of the hummock on which the domed mosque stands marks the original level of the plateau.

XUM

THIS IS ANOTHER TYPICAL VILLAGE SCENE IN MODERN TROGLOVILLE

The mass, or hummock, of pumice-stone has been utilized from top to bottom by the natives in their own peculiar way. These great hummocks thus utilized in Trogloville have advantages over the cone dwellings, which are conditioned by their shape, whereas here the dwelling may be enlarged in size at the pleasure of the householder. Note the cone on the right.

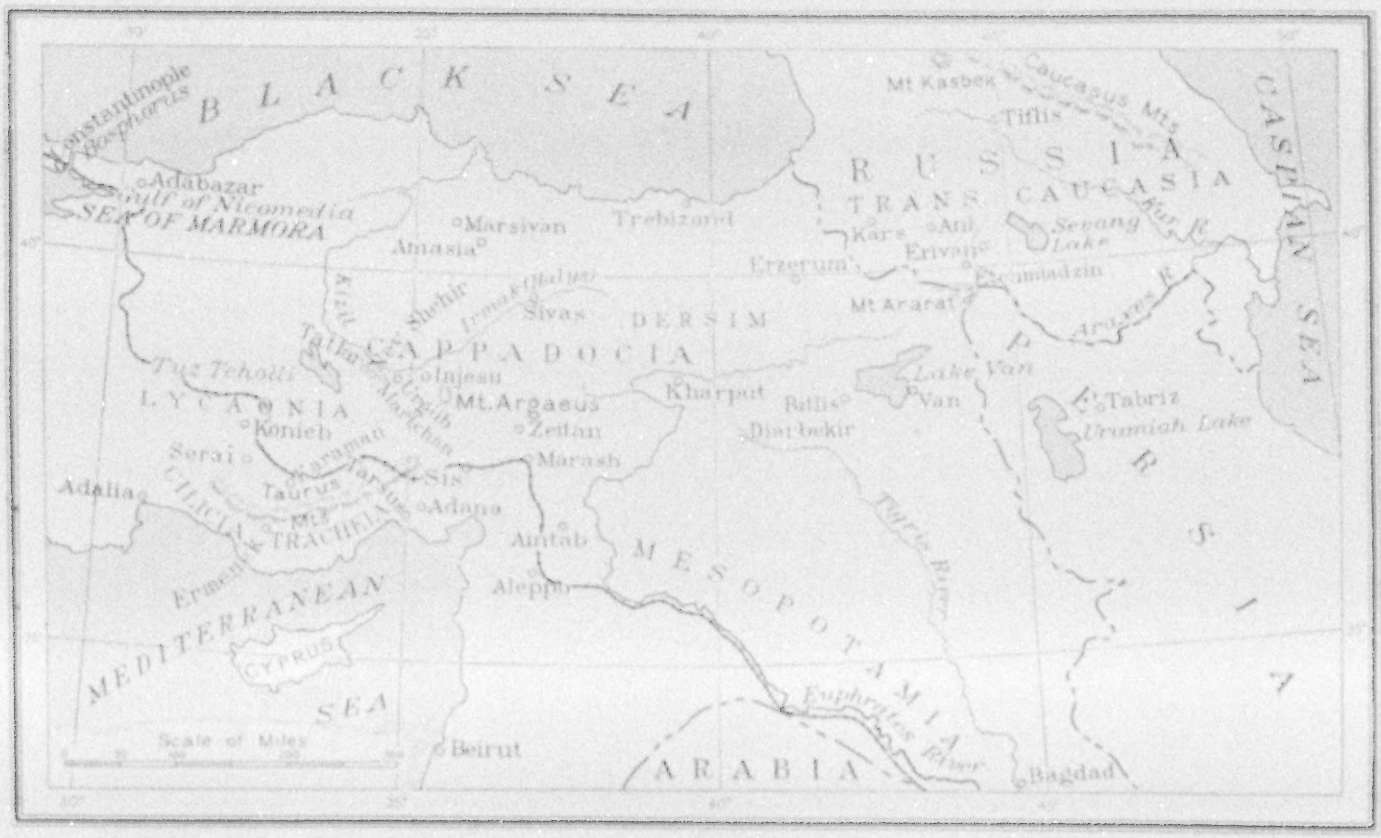


OFTEN A MODERN DWELLING IS EXCAVATED, NOT IN A CONE, BUT IN THE FACE OF THE BLUFF OR CLIFF

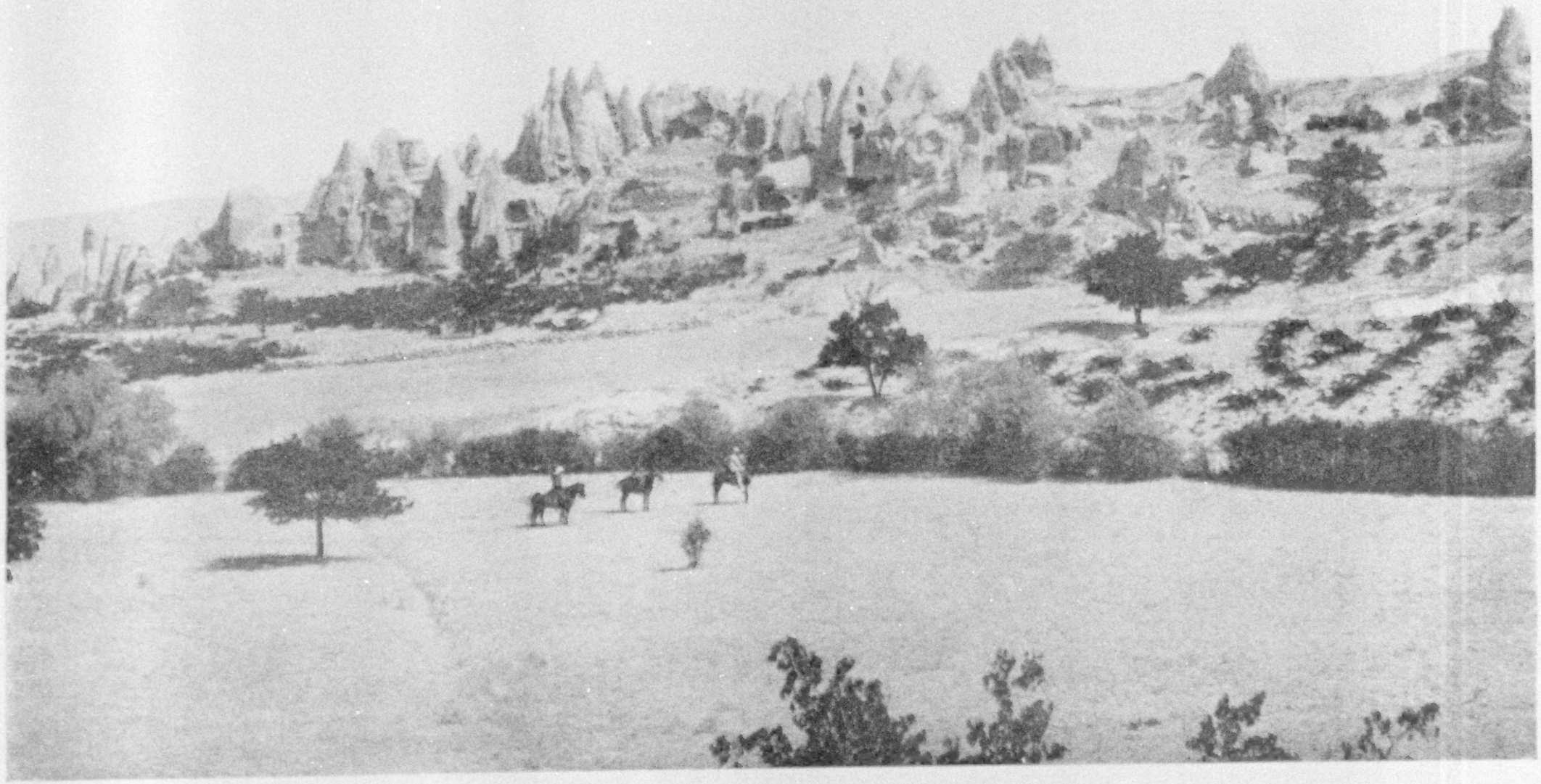
When this is the case the front, or façade, room, which opens upon the street, is the only room with light. The other rooms are enveloped in midnight darkness the year round. The owner of such an abode can extend his dwelling indefinitely into the earth and no one need know aught of his enlarged residence. The interior chambers are used chiefly as granaries and for storing away any and everything belonging to the household economy of a rude, agricultural, and semi-pastoral people. Even their chaff, which is made to take the place of our hay, is kept in these underground and densely dark chambers. What is stored there is safe from rain as well as from thieves. In this picture the scene is typical of the village of Urgüb (see also page 312). In the foreground are quarried blocks of pumice-stone intended for building purposes. The two-storied structure on the right will be seen in the next picture.

THIS PHOTOGRAPH WAS TAKEN FROM THE UPPER CHAMBER OF THE AUTHOR'S LODGING-PLACE AT URGÜB (SEE PAGES 312 AND 314)

To the uninitiated person there is not the slightest indication that we are in the presence of Troglodytic dwellings, and the reader will have to take the author's word for it. The group on the right is making life miserable for the present writer, who was at the moment examining something antique. This illustrates what happens to the traveling archæologist at every turn.

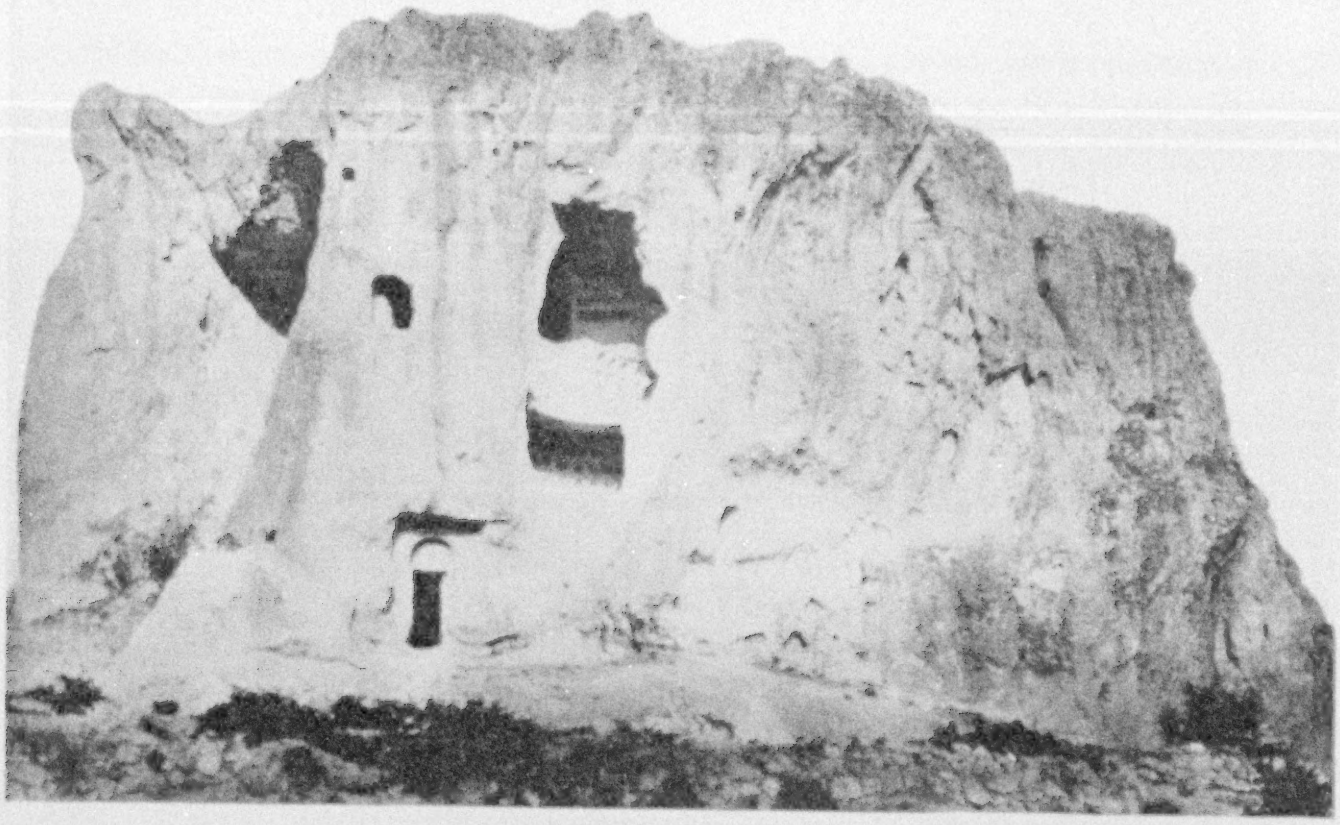


SKETCH MAP SHOWING LOCATION OF MT. ARGÆUS AND OF THE TROGLODYTES (SEE PAGES 283 AND 318)



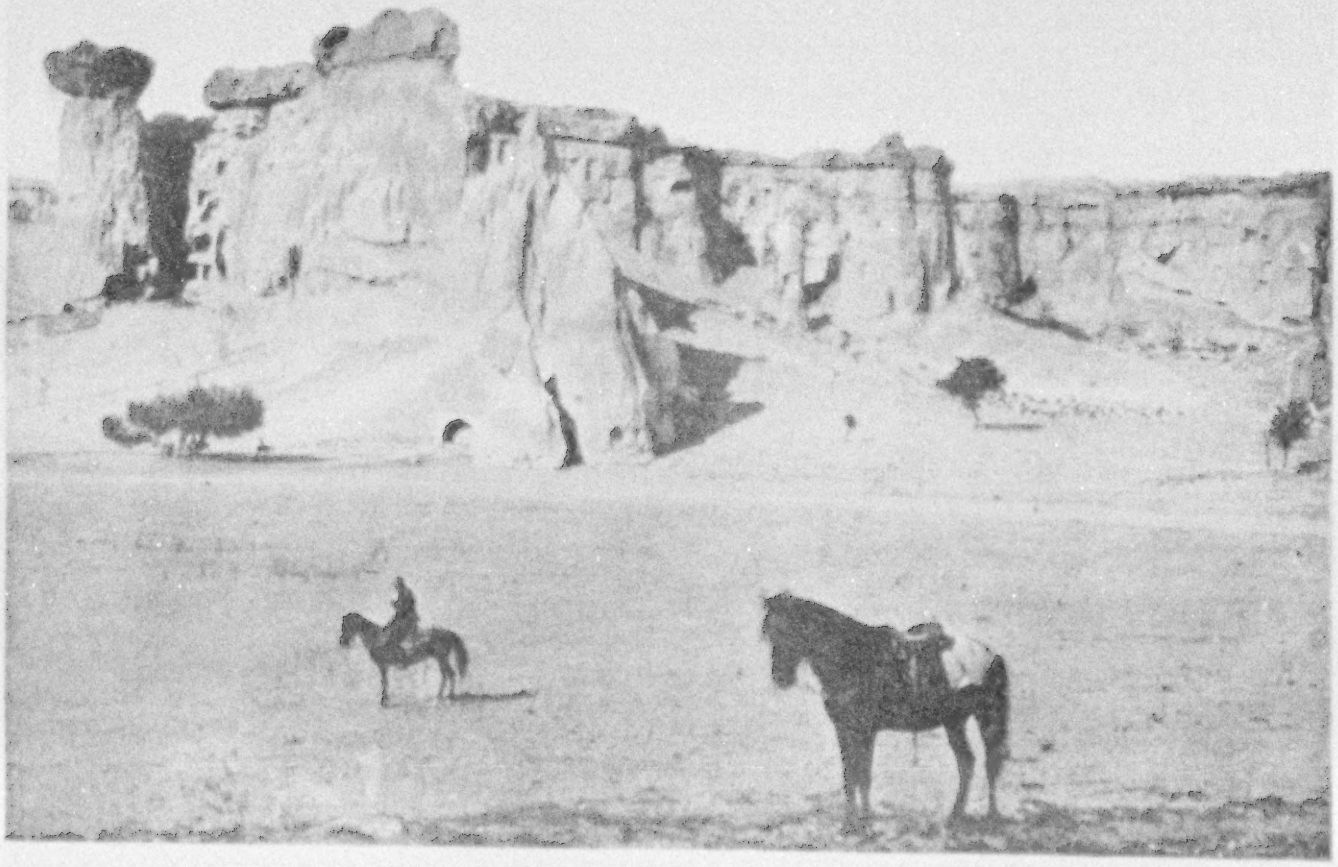
THE CLAIM HAS BEEN MADE THAT THIS VERY REGION IS THE ORIGINAL HOME OF THE APRICOT

The soil in the valleys, as seen here in the foreground, is fertile and produces grapes, vegetables, and fruit, chiefly apricots, of very fine quality.



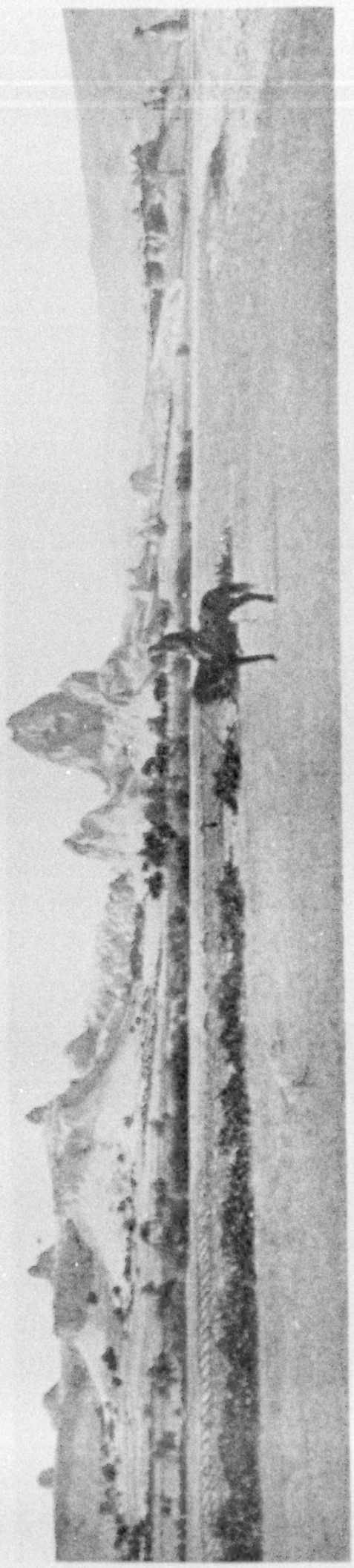
THE ELABORATE DOORWAY PROCLAIMS THAT THIS HUGE ROCK MASS, WITH ITS HUNDREDS OF CHAMBERS, WAS A PALATIAL RESIDENCE IN OLDEN TIMES, BUT NOW IT IS GIVEN OVER TO PIGEONS

The holes of ingress and egress for the pigeons are seen in the background of the two great openings in the wall.



IN THESE MASSES THE PROCESS OF DISINTEGRATION WAS RETARDED BY THE SUPERINCUMBENT LAYER OF LAVA

This was evidently a fashionable street in Trogloville, if we may judge by the numerous rectilinear, and therefore decorative, window openings. They are too small to be exposed chambers that were once inside the cliffs.



HERE WE HAVE A VIEW OF THE EXTREME EDGE OF THE CONE FORMATION, AT THE POINT WHERE THE CANYON RUNS OUT INTO THE PLAIN

The soil, even of the level ground seen here, is still disintegrated pumice-stone and very fertile. On the extreme right of the picture we see a tiny cone with its large cap. It is almost perfect and it is the smallest cone the author saw.

spirited. The headman explained to the Greeks how they should wrap small bags or sacks around the feet of the horses and other cattle when marching through the snow, for without such precautions the creatures sank up to their bellies."

A BIBLICAL REFERENCE TO WEALTHY TROGLODYTES

Often the cave-dwellers attained to great wealth and even to political importance. The prophet Obadiah (1:3) certainly had such Troglodytes in mind when he speaks of the pride and the arrogance of the Edomites, of their feeling of confident security because of the fact that they dwelt in the lofty clefts of the hills, beyond the reach of their enemy.

Mt. Argæus (see text, page 283), now an extinct volcano, though it was still smouldering in the time of Strabo, is situated almost in the center of the peninsula of Asia Minor (see map, page 315). The material ejected by this volcano during the many ages when it was active covers an immense area and consists of a vast bed of pumice-stone or tufa of unknown depth, on top of which there flowed a sheet of lava which varies in depth from four to ten or twenty feet (see pages 322, 327, 329).

The territory thus affected by the eruptions of Mt. Argæus extends from the southwest to the northwest of the mountain for a distance of between thirty and forty miles, covering the entire region between Injesu, Martchan, Urgüb, Udj Assarü, Nev Shehir, and Tatlar on the west and extending to Soghanlü Dere (valley) on the south, while on the north and northwest it extends far to the north of the Kizil Irmak (Halys), which has been flowing across the bed of pumice-stone from remote geological times.

The pumice-stone is soft. It is reported that one man excavated a chamber 25 feet long, 13 feet broad, and 10 feet high within the space of 30 days.

FIRST EUROPEAN TRAVELER AMONG TROGLODYTES CONSIDERED A GULLIVER

Paul Lukas, who traveled in Asia Minor at the behest of Louis XIV, was the first European to visit this region, but his visit was very hurried, and, strange as it may seem, he thought that these cones

THIS PHOTOGRAPH RECALLS VERY FORCIBLY THE WORDS OF THE PROPHET OBADIAH, WHO, IN SPEAKING OF THE EDOMITES OF THE REGION OF PETRA, SAYS:

"The pride of thy heart hath deceived thee, O thou that dwellest in the clefts of the rock, whose habitation is high; that saith in his heart, Who shall bring me down to the ground? Though thou mount on high as the eagle, and though thy nest be set among the stars, I will bring thee down from thence, saith Jehovah." But the inhabitants of "the Mount of Esau" were of a much later date and much more refined Troglodytes than those with whom we are dealing now. The summit of this pillar of the sky (near Urgüb) represents approximately, but only approximately, the original level of the whole surrounding country. And if that be so, then an amazing amount of erosion and disintegration has taken place. A modern village cemetery is in the foreground. Note the human figures.

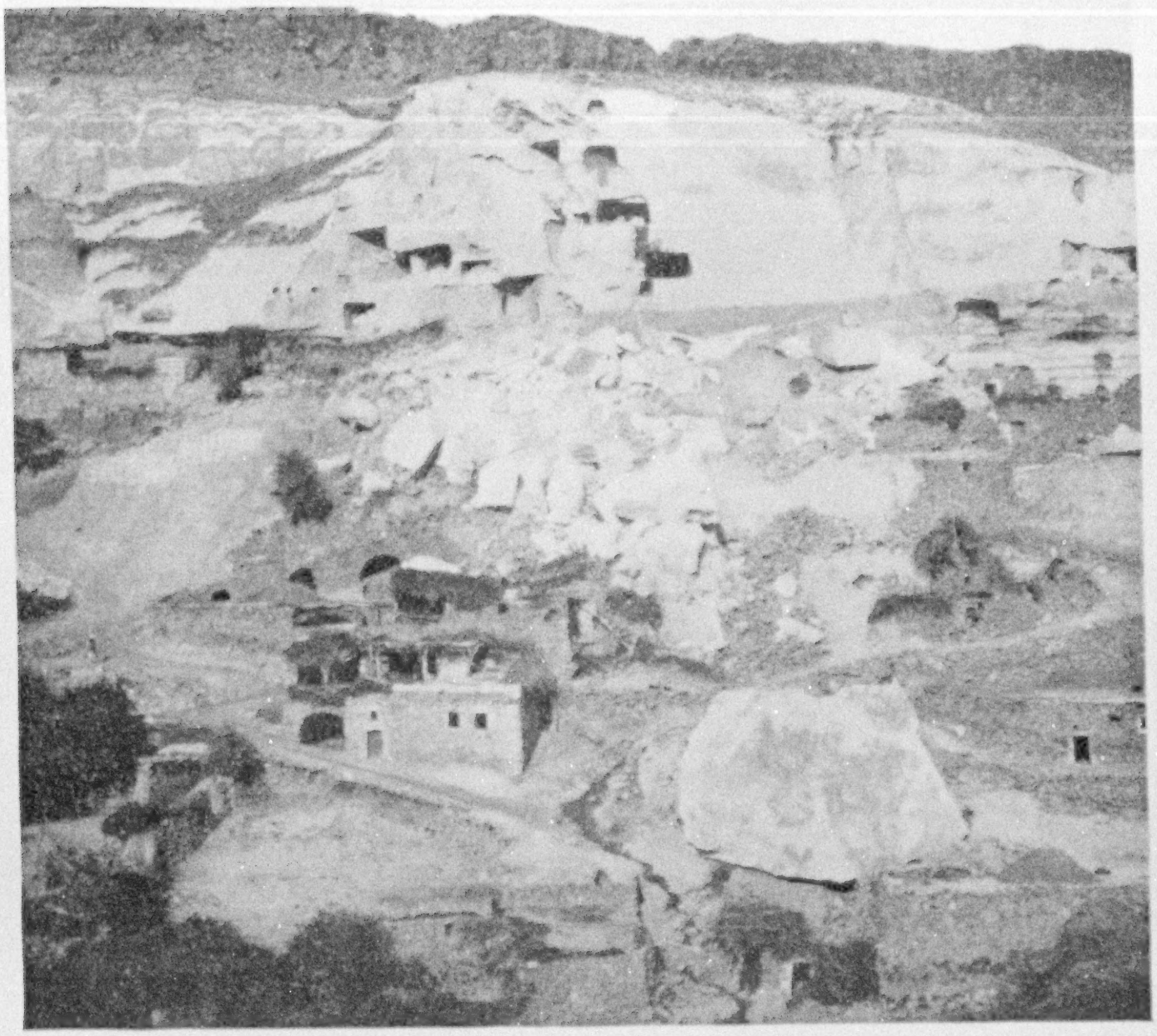
were builded by man, and the stories he told about the wonders he saw were not believed by any one.

For instance, the German poet Wieland gives utterance to the following reflections in regard to Lukas and this cone-country:

"Traveled persons are inclined to tell extravagant stories, and to exaggerate what they have seen, and I cannot affirm

AS ONE JOURNEYS WESTWARD FROM UDJ ASSARÜ AFTER PASSING NEV SHEHIR, ONE REACHES A VAST LAVA FIELD THAT OVERLIES THE PUMICE-STONE; IT IS STILL VERY ROUGH AND UTTERLY BARREN

The village of Tatlar lies in a valley formed by erosion in this lava field. The valley head is seen in the background of this picture. The cone formation is not a prominent feature of the Tatlar landscape, but the activity of the Troglodytes is everywhere visible in the bluff on the left. Note sledding wheat on the left.



OCCASIONALLY A GREAT BOULDER BREAKS AWAY FROM THE BLUFF AND THUNDERS DOWN UPON THE WRETCHED VILLAGE, LEAVING DEATH AND DESTRUCTION IN ITS WAKE

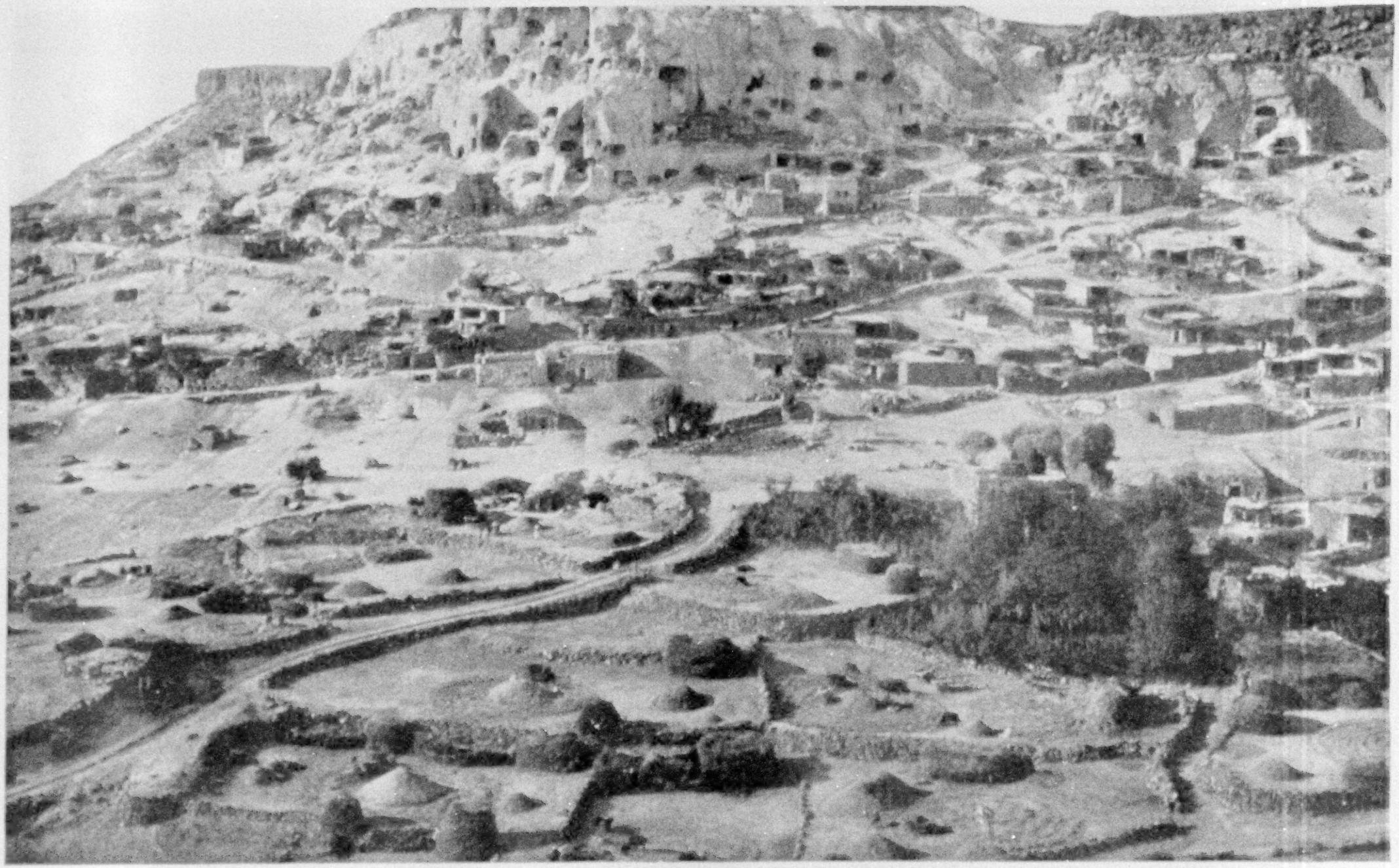
Only four days before the author's visit such a boulder had precipitated itself upon the village, burying twelve houses and killing five men (the women who were killed were probably not counted). Several rocks were threatening to fall. The poor people appealed to the visitor as to one who must needs have superior knowledge: "Does danger threaten our house?" "Will that rock fall?" The largest piece of the devastating rock is seen in the foreground. Its course can be traced, and the chambers exposed when it broke away are plainly visible. The course of the rock may be discerned also in the preceding picture.

that Paul Lukas is wholly free from this universal weakness. To give only a few instances from his book of travels, I ask if there can be found a man who will not consider Lukas's story about the innumerable host of pyramids exaggerated? He affirms that each one of these pyramids is hewn from a single stone (page 283), and that they are hollowed out in such wise that they have fine doors for entrances (page 317), that they have several apartments rising one above the other (page 282) and connected with each other by means of interior stairways, and that these apartments are lighted by large windows (page 324).

"Many of these remarkable buildings," continues Wieland with true Prussian superiority and cocksureness, "according to our traveler, have never been excavated into dwellings (page 289), though the excavation of many of them had been begun, but was left in an unfinished state.

"He asserts that on the one side of the bluff by which his caravan passed there were no fewer than 20,000 such build-

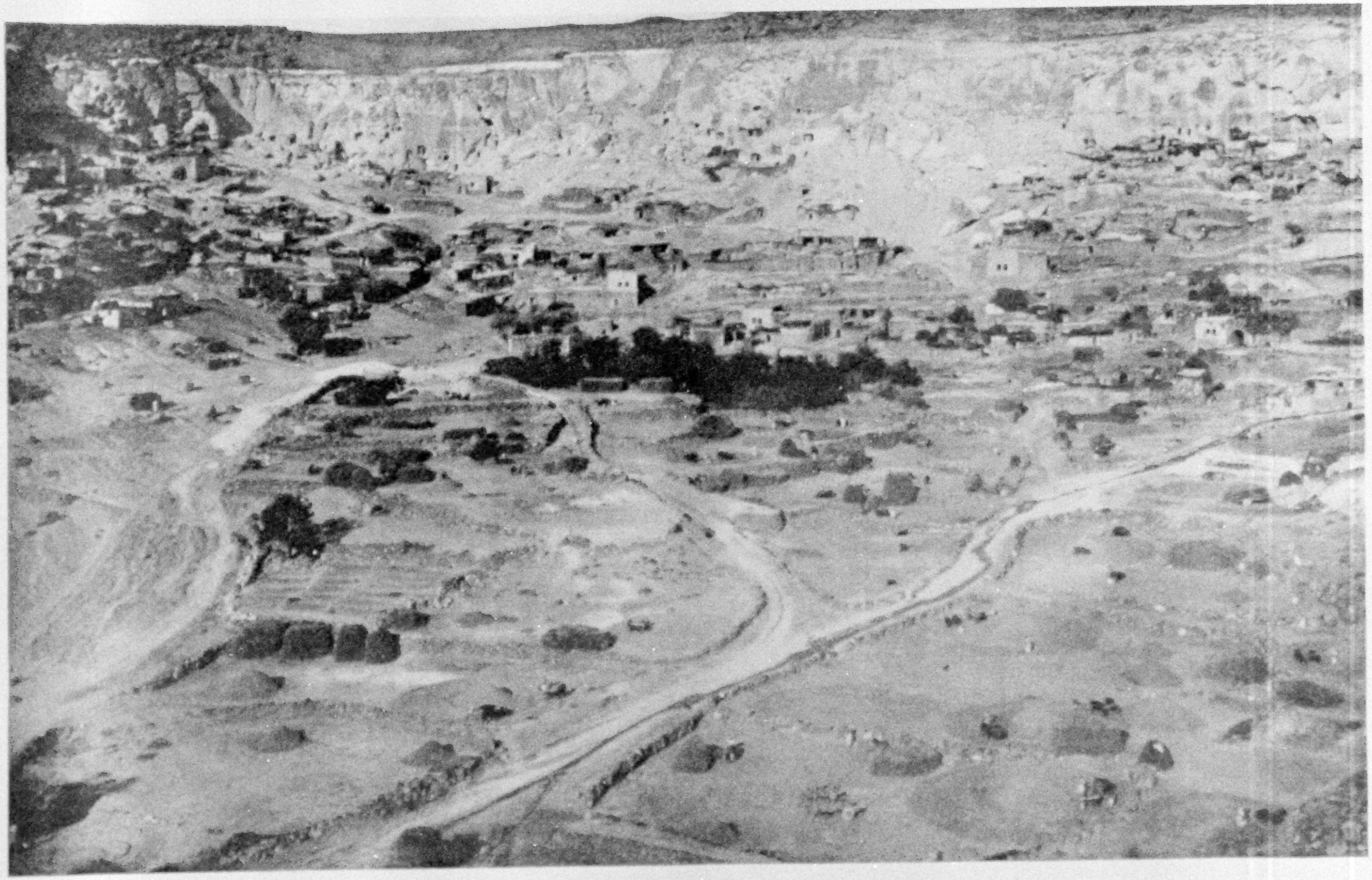
XUM



THE DWELLINGS OF TATLAR ARE EXCAVATED IN THE FACE OF THE BLUFF, WHICH IS OF TWO LAYERS, AS USUAL

Both strata are clearly seen here; first the overlying stratum of lava and beneath that the deep bed of white pumice-stone, in which the dwellings are excavated. The excavated chambers at Tatlar are almost interminable and they inspire the present natives with awe. It is said that it is dangerous to wander far into the interior of the earth here, and the natives are not willing to act as guides. The threshing-floors in the foreground are most interesting.

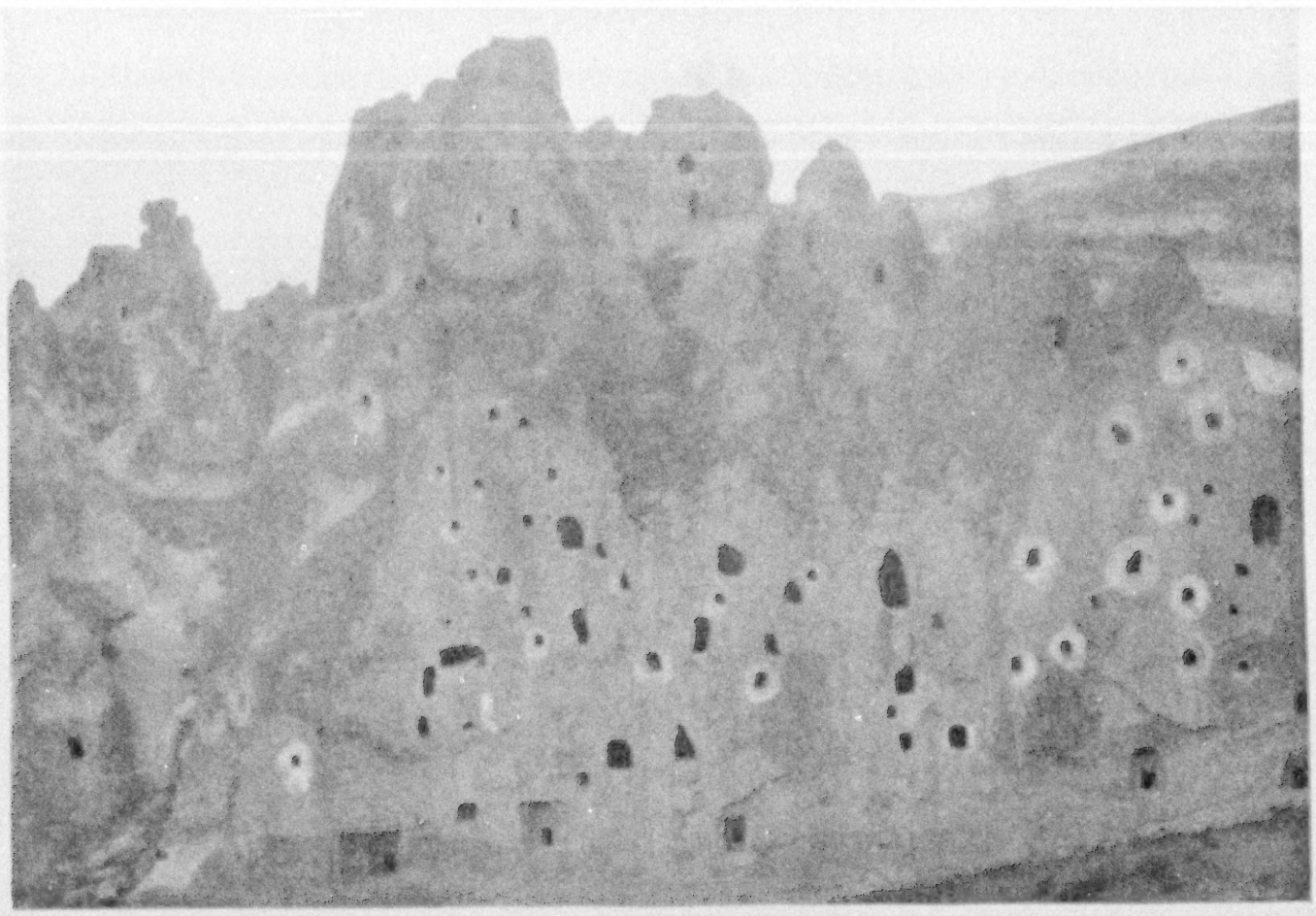
XUM



DISTANT VIEW OF THE CLIFF-DWELLINGS AT TATLAR; ON THE THRESHING-FLOORS AT LEAST 12 YOKE OF OXEN MAY BE DISTINGUISHED

IN THE LEFT HALF OF THIS PICTURE A HOST OF WINDOW-OPENINGS ARE VISIBLE, BUT NOT A SINGLE DOORWAY, AND THE ENTRANCE TO ALL THIS AMAZING MULTITUDE OF CHAMBERS IS FAR AWAY TO THE RIGHT

Nothing could better illustrate the immensity and far-spreading nature of these subterranean chambers, which were rendered more difficult of access and less liable to invasion by reason of the infrequency of means of ingress (see next page).



THIS IS A PICTURE OF SOGHANLÜ DERE (ONION VALLEY), WHICH LIES A FULL DAY'S JOURNEY SOUTH OF THE UDJ ASSARÜ (SEE PAGES 286, 287) AND URGÜB REGION (SEE PAGES 312, 314)

It is a canyon branching from the larger canyon of Ortakieui (Middle Village). (See pages 328, 329). Its cliffs are mere shells and they contain thousands on thousands of chambers, churches, chapels, and graves. Cones, though they do occur even here, are rare, but there are no temple or church façades, as at Martchan (see pages 303, 308). In this picture one sees five entrances, while all the numerous other openings are windows. Story rises upon story. Thousands of pigeons now have their homes in these dusky chambers in the rocks, for at this place they are no longer inhabited by man. Notice the windows painted on the outside. The author can give no explanation of the painting. In the numerous chapels pictures of Greek saints may still be seen on the walls; many of the saints represented in the pictures are named in Greek. In the floors of the chapels graves are cut, and in some of them we found human skeletons quite exposed. Indeed, graves are frequently found in the dwellings themselves, and so it seems clear that the people lived in the same rooms with their pigeons and their dead.

ings, and that he had been told that on the other side of the valley a still greater number were to be seen.

"Can anything be more incredible than that there can exist such a vast host of pyramids excavated into ordinary dwelling-houses? For they certainly did not spring from the earth like mushrooms. Moreover, not a single word about them is to be found in any ancient author nor in the narrative of any other traveler. We might understand this silence if Lukas had discovered the pyramids in the great Syrian Desert, but in a land as well known as Cappadocia—!

"However, since Paul Lukas affirms that he saw them with his own eyes, they must be there. But we shall have to strike out at least one nought from the number, which, according to his estimate, is more than 50,000. Five thousand such pyramids is still a very respectable number, and in view of the hasty and superficial way in which Lukas saw them (for his caravan did not stop, nor was he permitted to leave it), he should have distrusted a calculation made by his eyes alone."

THEIR ANCIENT STORY WAITS UPON ARCHÆOLOGISTS AND EXCAVATORS

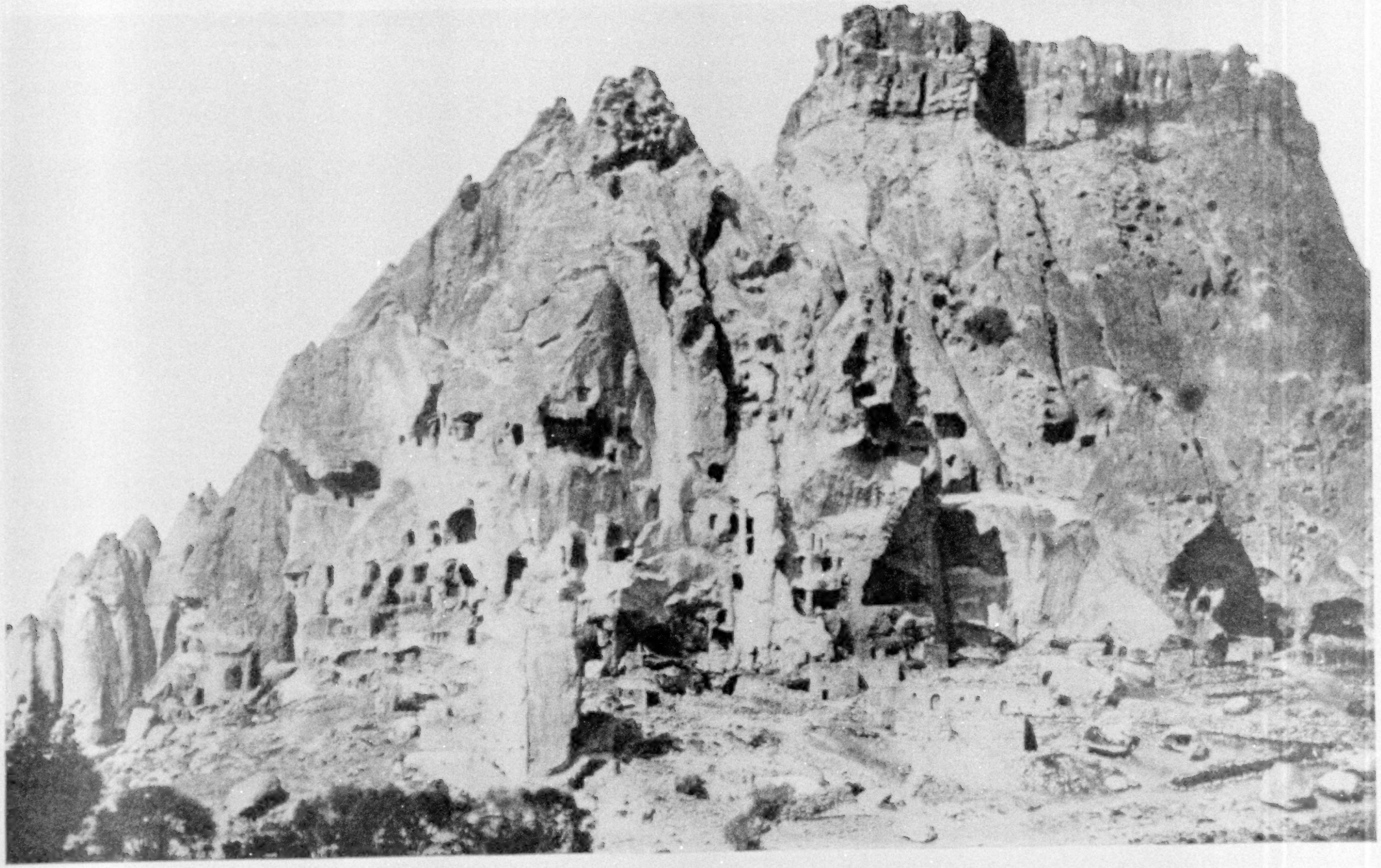
And yet Lukas was right, except in supposing that the cones were constructed by man, if indeed he did actually entertain

HERE THE FACE OF THE ROCK HAS BEEN BROKEN AWAY BY EARTHQUAKES, SO THAT A NUMBER OF CHAMBERS ONCE IN THE INTERIOR OF THE CLIFF NOW STAND EXPOSED

The holes in the walls of the exposed chambers were intended to serve as shelves. In a number of places one may see the thickness of what we may call the floors; or, in other words, the thickness of the stone left between two superimposed rooms. It seems very thin here, and often it was too thin to bear the weight it was expected to bear. Behind the fragmentary rooms seen here there are countless others, invisible because hidden in the earth (see also next page).

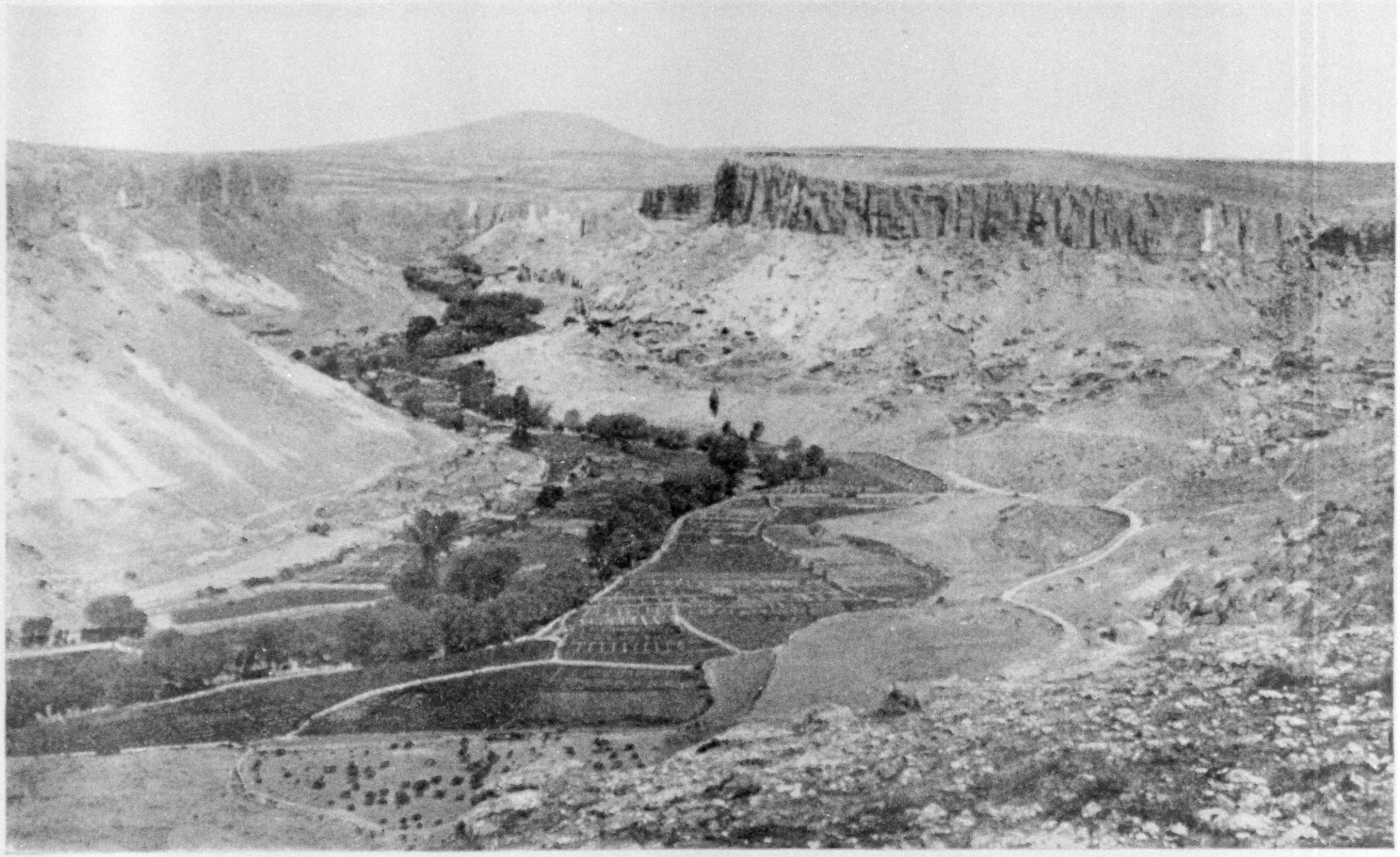
XUM

XUM



THE GREAT HEIGHT OF THE CLIFF WILL APPEAR FROM A COMPARISON WITH THE MODERN HOUSES AT ITS BASE.

The interior of this cliff is one vast network of excavated chambers, so numerous and intricate that the natives do not venture in them for fear of getting lost. The stratum of lava which is spread out over the whole region, while shown of considerable depth in this picture, is thin, as compared with the tremendous depth of the pumice-stone. The lava bed is seen at the top of this picture. Beneath it is the pumice bed. The vastness of this volcanic material indicates the ancient violence of Mt. Argæus (see page 283). The cone formation is seen here in its incipient stages, and to the left of the picture is seen a cylindrical column.



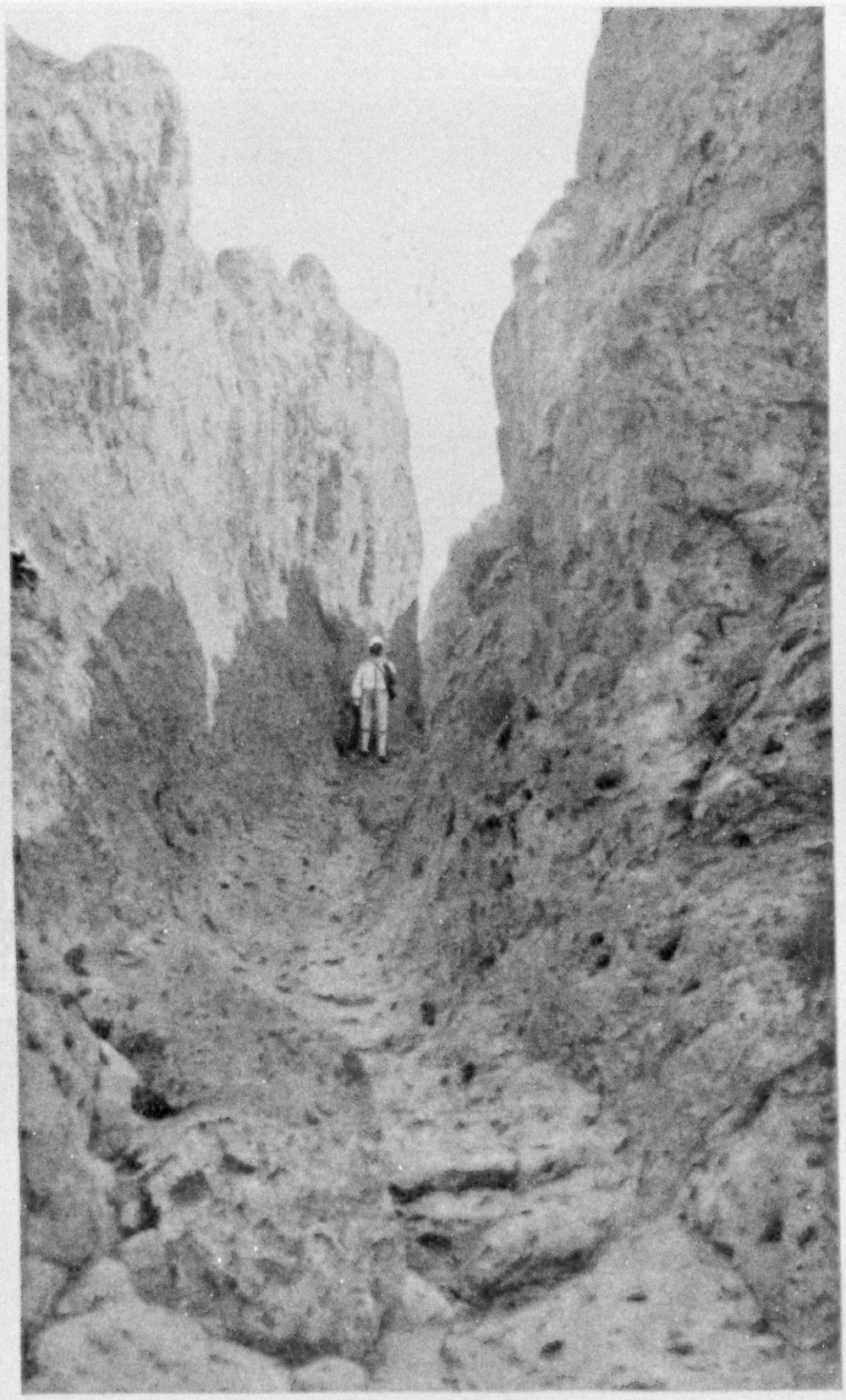
THIS IS A VIEW OF THE VALLEY ABOVE ORTAKIEUI

All of these valleys are breaks in the surrounding plateau, whose general level is given by the rim of the bluffs. The original creative cause of all the valleys like this is a small stream of water. The width of this valley at its head (see next page), just hidden from view here, is about three hundred yards; but its width increases steadily, until the maximum of one thousand yards is reached at the point below here where the author had to bid it farewell. The surrounding plateau is waterless, and therefore a semi-desert waste during the hot season of the year; but the soil in the little valley is very fertile, delighting the eye with its luxuriant gardens.

XUM

THE LARGE VILLAGE OF ORTAKIEUI, WHICH IS ONE OF THE FEW VILLAGES IN THE INTERIOR OF ASIA MINOR IN WHICH GREEK IS STILL SPOKEN; THERE ARE OTHERS IN THIS SAME REGION—GELVERE, MALAGOB, NIGDE

Christianity was always strong in this region, which produced Saint Gregory and the Basils. Indeed, Gregory was himself a Troglodyte, and his very farm can be located. Numerous rock-cut dwellings are visible in the bluff behind Ortakieui.



THE ENTRANCE TO THE VALLEY OF ORTAKIEUI (SEE PAGE 328)
FROM THE PLATEAU IS ARTIFICIAL, CONSISTING OF A
ROADWAY EXCAVATED THROUGH THE
RIM-ROCK OF THE BLUFF

The roadway descends sharply. No doubt this roadway has grown in depth as the valley itself grew in depth, for its beginning goes back to at least 2,000 years before Christ. It is now much worn, and animals find difficulty in getting down the slick and naked stone.

such a belief, for I have never been able to consult a copy of his book and I rely on Wieland for my information. It is true that I have not seen the entire field covered by this formation, but I worked faithfully inspecting and photographing the cones, and I find no difficulty in agreeing with Lukas that there are more than 50,000 cones.

The cones of Cappadocia were characteristic features of the country in the third millennium before Christ. History and archæology cannot trace them further, because, as yet, nothing is known about periods in Asia Minor more remote than that; but the spade and the archæologist may soon reveal that history to a waiting world.

THE MURMAN COAST

Arctic Gateway for American and Allied Expeditionary Forces in Northern European Russia

THE relatives and friends of American troops comprising, with French and British units, an expeditionary force operating along the Archangel-Vologda Railway line in northern Russia, have an especial interest at this time in the Murman Coast, which has been the gateway through which have passed all the munitions and supplies of food and clothing for this army during the winter months, when Archangel itself has been closed to the shipping world by a barrier of ice.

Murmansk, the chief port of the Murman Coast, is more than 300 miles nearer the North Pole than is Archangel, but, thanks to the warm waters of the Gulf Stream, which temper the winds blowing over it, the Kola Inlet, on which this army entrepôt is situated, is open to navigation twelve months in the year.

Until the closing of her Baltic ports by German blockade and the sealing of her channel of egress to the south through the Dardanelles by the alliance of Turkey with the Teutonic Powers, imperial Russia had paid small heed to the greatest asset of her Arctic shores—the Kola Inlet, an arm of the sea penetrating deep into the Murman Coast. It is true that a naval base had been established in Catherine Harbor, Kola Inlet, 20 years ago; but its port of Alexandrovsk, which is 20 miles north of the new port of Murmansk, had lain neglected and the Slavs continued to depend entirely upon Archangel as a commercial gateway for this part of their vast domain.

The port of Archangel, under the most favorable circumstances, is closed by ice to sailing vessels for six months in the year, to smaller steam craft for four months out of the twelve, and to the largest types of ice-breaking ships for at least two of the winter months.

This interruption to commerce, owing to ice floes in the Gorlo, the neck of the White Sea bottle, was of small consequence to the Slavs in the easy-going pre-1914 days; but after the tragic rout of the Tsar's forces at the battle of Tannenberg, in the Mazurian Lakes region, and the subsequent debacle on the Dunajec, Russia and her Allies knew that her continuance in the struggle against the Prussians would depend upon an ever-increasing flow of supplies and munitions to the inadequately equipped armies of Brusiloff, Alexieff, and the Grand Duke Nicholas.

It became evident that any "time out" for the ice blockade of Archangel was unthinkable, and in this emergency the Murman Coast and its ice-free port was to come into its own. Until that time the region was almost as little known to the Russian people as to the rest of the world.

THE MURMAN NOW AIDS AMERICA

Having served Russia when that country was an ally of the Entente nations, the Murman region today is the short link in the chain which connects the forces of the Allies and America with their bases of supply overseas. The

XUM

A. H. Bumstead, Cartographer

A MAP OF THE MURMAN COAST AND THE TERRITORY THROUGH WHICH RUNS THE NEW MURMAN RAILWAY

The Murman Railway was the artery which supplied with food, clothing, and munitions the American and Allied forces in Northern Russia during the winter months.

journey from the United States to Petrograd is 5,000 miles shorter by way of Halifax and the Murman ice-free port of Murmansk than by way of Seattle to Vladivostok and thence westward on the Trans-Siberian Railway.

All during the past winter months 5,000 American troops, coöperating with 12,000 British, 2,700 French, 1,500 Siberians, and 1,400 Italians, received a constant flow of supplies of food, clothing, and munitions through Murmansk, which did not come into existence until 1916.

Murmansk is the northern terminus of the Murman Railway, a single-track line which connects the ice-free port with Petrograd by way of Kandalaksha, Kem, Petrozavodsk, and Zvanda, 660 of the 900 miles of the line having been constructed since 1914 in the face of some of the greatest obstacles ever encountered in civil engineering.

War work on the Murman Railway

THE SEA NEVER FREEZES ON THE MURMAN COAST

The beneficent Gulf Stream, which saves England from a climate similar to that of Labrador, also rescues the Murman from six months of ice-bound waters, such as block the harbors of the White Sea.

Photographs by Nathalie Loubovitsky

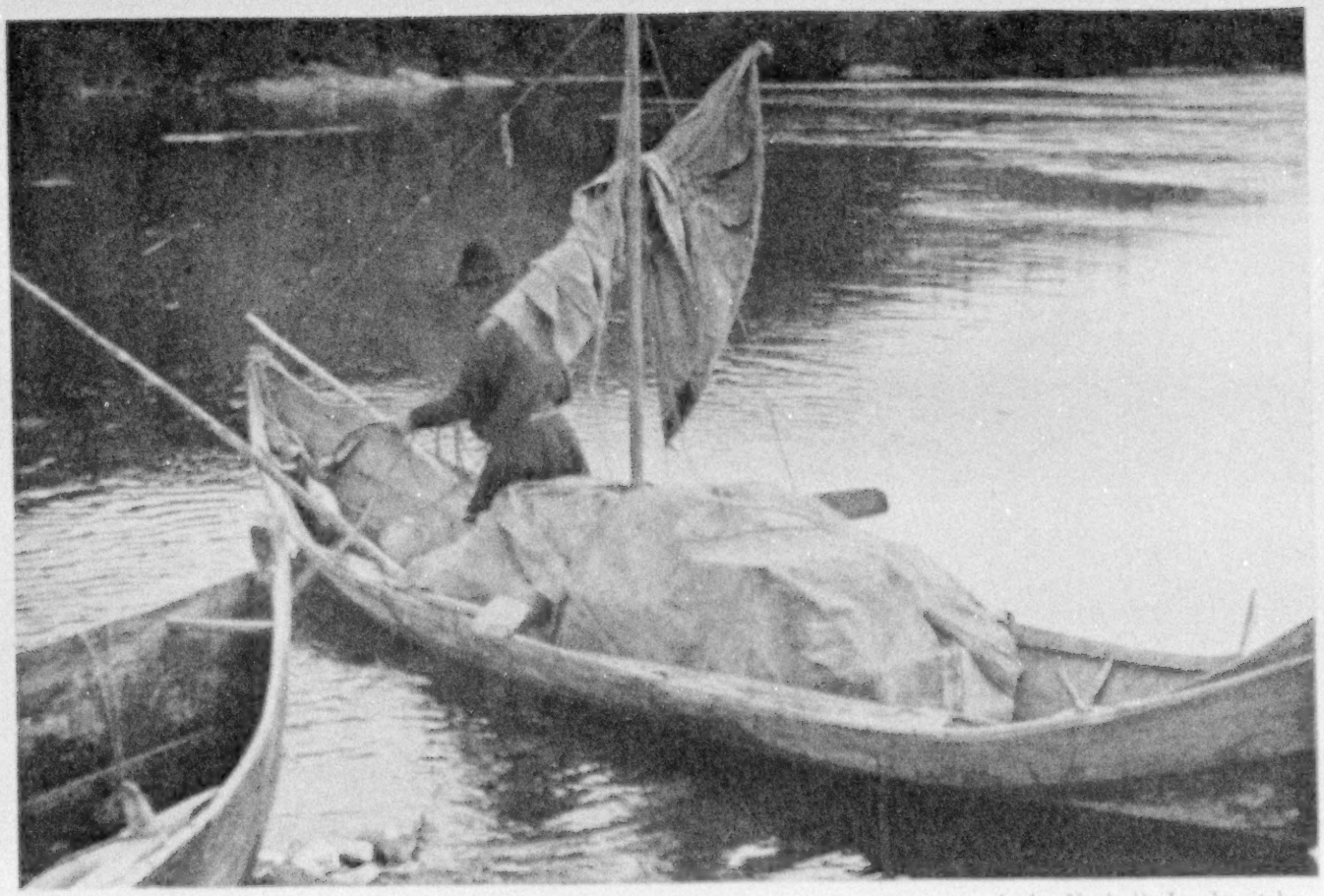
MOST OF THE FISHERMEN OF THE MURMAN COAST ARE ONLY TEMPORARY RESIDENTS

The Pomoros, who dwell in the region west of the White Sea, travel northward to the Arctic shores in the summer and live in cantonments, or small, closely huddled villages. They are descendants of the Novgorod Russians, in whose annals there is mention of the village of Kola as early as the middle of the thirteenth century.

XUM

A LIGHTHOUSE TO THE EAST OF ALEXANDROVSK

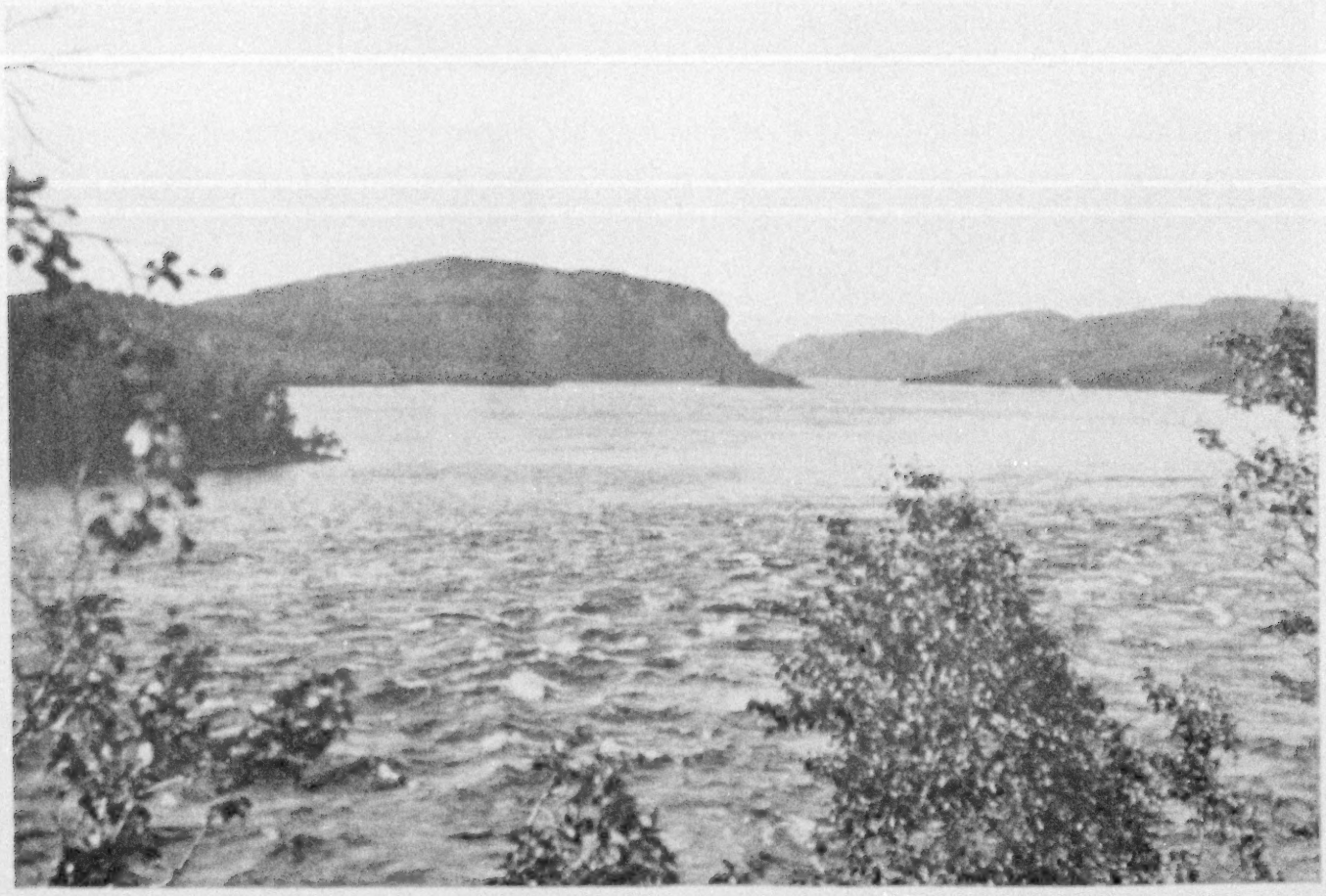
In addition to such beacons to guide the mariner, stations have been established on the Murman Coast for the study of meteorological conditions in order that fishermen may be warned of stormy weather. Life-saving boats put to sea when storm signals fly.



Photographs by Nathalie Loubovitsky

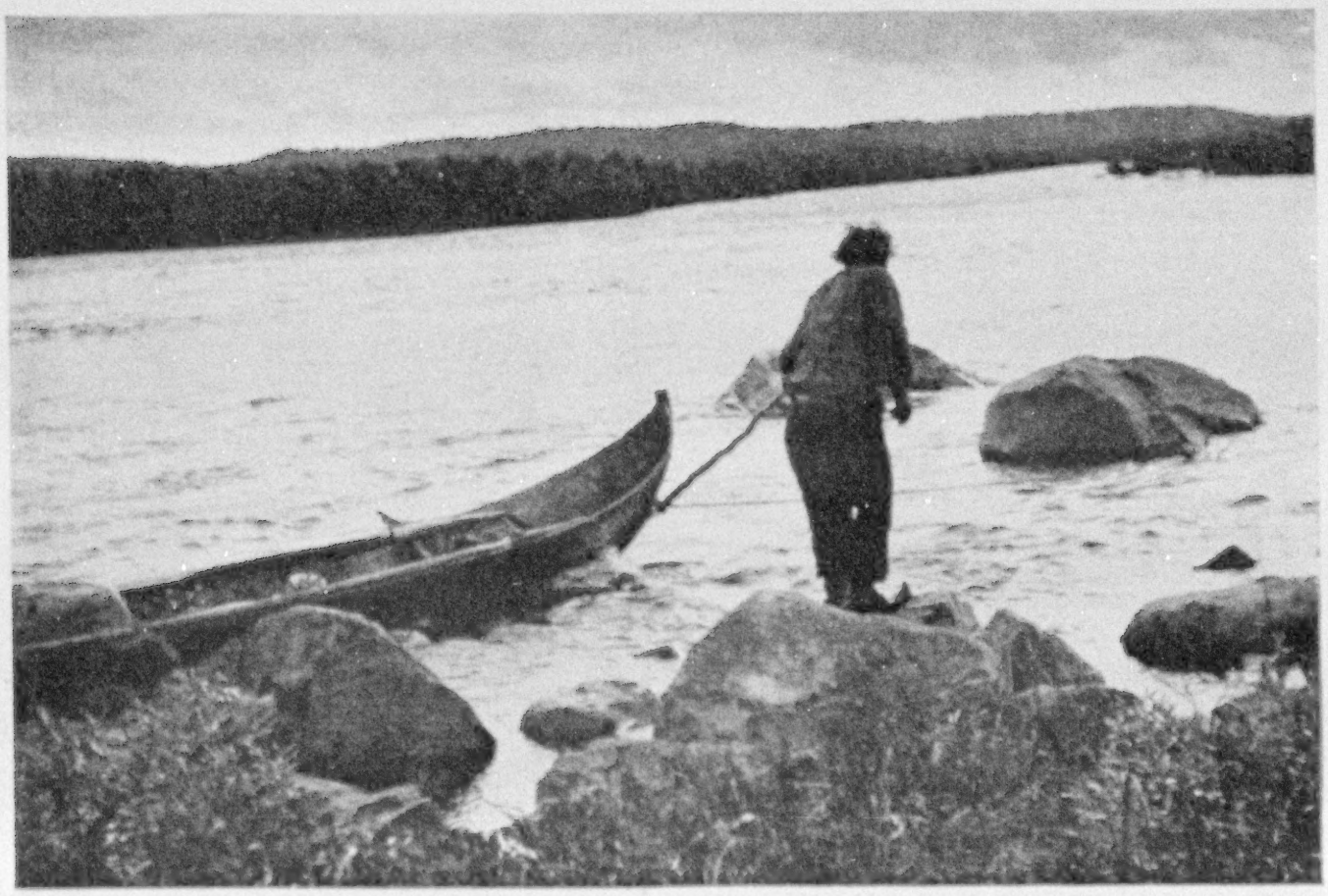
FISHING BOATS IN A QUIET HARBOR ON THE MURMAN COAST

Murmansk, Russia's only ice-free port in the north, is situated on the eastern shore of the Kola Inlet, 30 miles south of the Arctic coast. The inlet is a mile and a half wide at this point and there is a depth of 32 feet at the piers, while it is 70 feet deep a few hundred yards from shore. The inlet has no currents and large ships may be shifted from one side of the pier to the other without the aid of tugs. There is an eleven-foot tide.



THE RAPIDS OF THE PASVIK RIVER EIGHT MILES FROM ITS INFLUX INTO VARANGER FJORD

Boris Glob, the most westerly Russian settlement of the Murman Coast, is situated on the banks of this river (see page 338).



Photographs by Nathalie Loubovitsky

TYPE OF CANOE USED BY MURMAN FISHERMEN

Until the war-time necessity arose for an open harbor twelve months in the year, even the Russians knew little about the Murman country, but with the outbreak of the European conflict Kola Inlet became of vital importance to the whole Slavic empire.

XUM

A SINGLE HABITATION IN THE MIDST OF MILES OF DESOLATION

Most of the houses of the Murman region are one-story structures, built of unhewn logs. The crevices are packed with native moss. In the western end of the Murman, forests of birch, pine, and spruce are to be found within 20 or 25 miles of the Arctic shore, but farther east, where the influence of the Gulf Stream wanes, the timber line is 60 to 70 miles inland.

Photographs by Nathalie Loubovitsky

SUMMER HOMES OF MURMAN FISHERMEN

Whaling was a profitable industry on this coast more than forty years ago, but these animals have now entirely disappeared. Cod, herring, and salmon are the principal food fish.

A ZIRINIAN AND HIS FLEET-FOOTED FOUR-IN-HAND

During the nineteenth century a few Zirinians (also called Syrenians), a nomadic people residing on the west side of the Urals, migrated to Lapland in an effort to outrun a disease which was destroying their herds of reindeer. The animals which they brought with them were of a splendid stock. The Zirinians are skillful in handicraft and are excellent hunters.

Photographs by Nathalie Loubovitsky

PECHENGA MONKS AT WORK ON TIMBERS FOR A HIGHWAY BRIDGE

Wood is an extremely valuable commodity along the Arctic coast, but there are vast forests of birch and pine in the interior. Under the imperial régime the forests were strictly regulated by the administration of Archangel.

WHERE RUSSIA AND NORWAY MEET: THE WESTERN EXTREMITY OF THE MURMAN COAST

At the mouth of the Pasvik River the two houses, the church, and the Lapp huts in the left foreground comprise the most westerly Russian settlement on the Murman Coast. The town is known as Boris Glob and is located on one square mile of Russian ground in Norwegian territory, this part of the coast having been given to Norway, with the exception of Boris Glob, in the treaty of 1825.

Photographs by Nathalie Loubovitsky

AT THE OTHER END OF THE MURMAN: ON THE SHORES OF THE WHITE SEA

A Russian town which is inhabited almost exclusively by trading people and fishermen. In the summer-time it is practically deserted, as the fisher-folk journey westward to the various settlements on the Murman Coast. This photograph was taken at midnight in June.

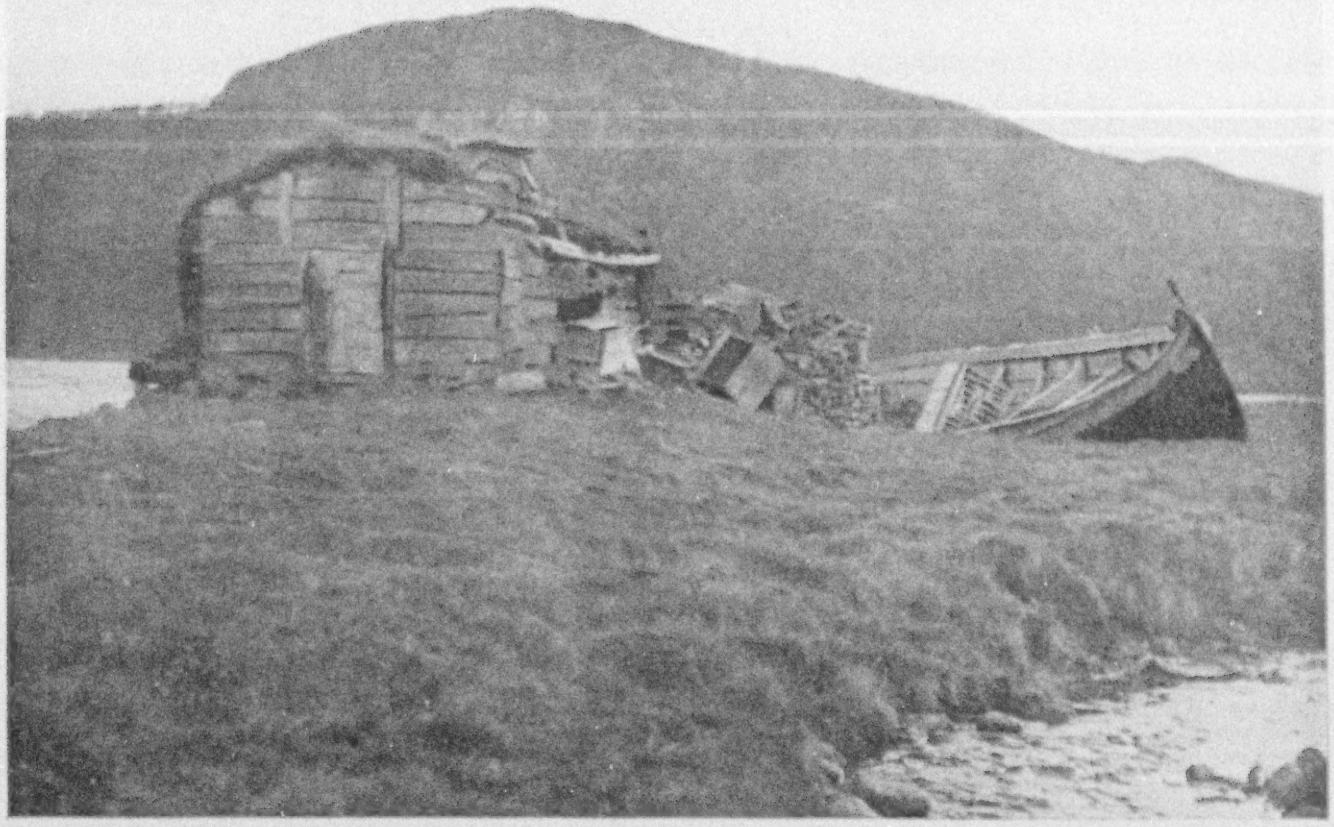
LOW TIDE AT MIDNIGHT IN JUNE: EASTERN MURMAN

Photographs by Nathalie Loubovitsky

HIGH TIDE IN THE SAME FISHING VILLAGE HARBOR SHOWN ABOVE

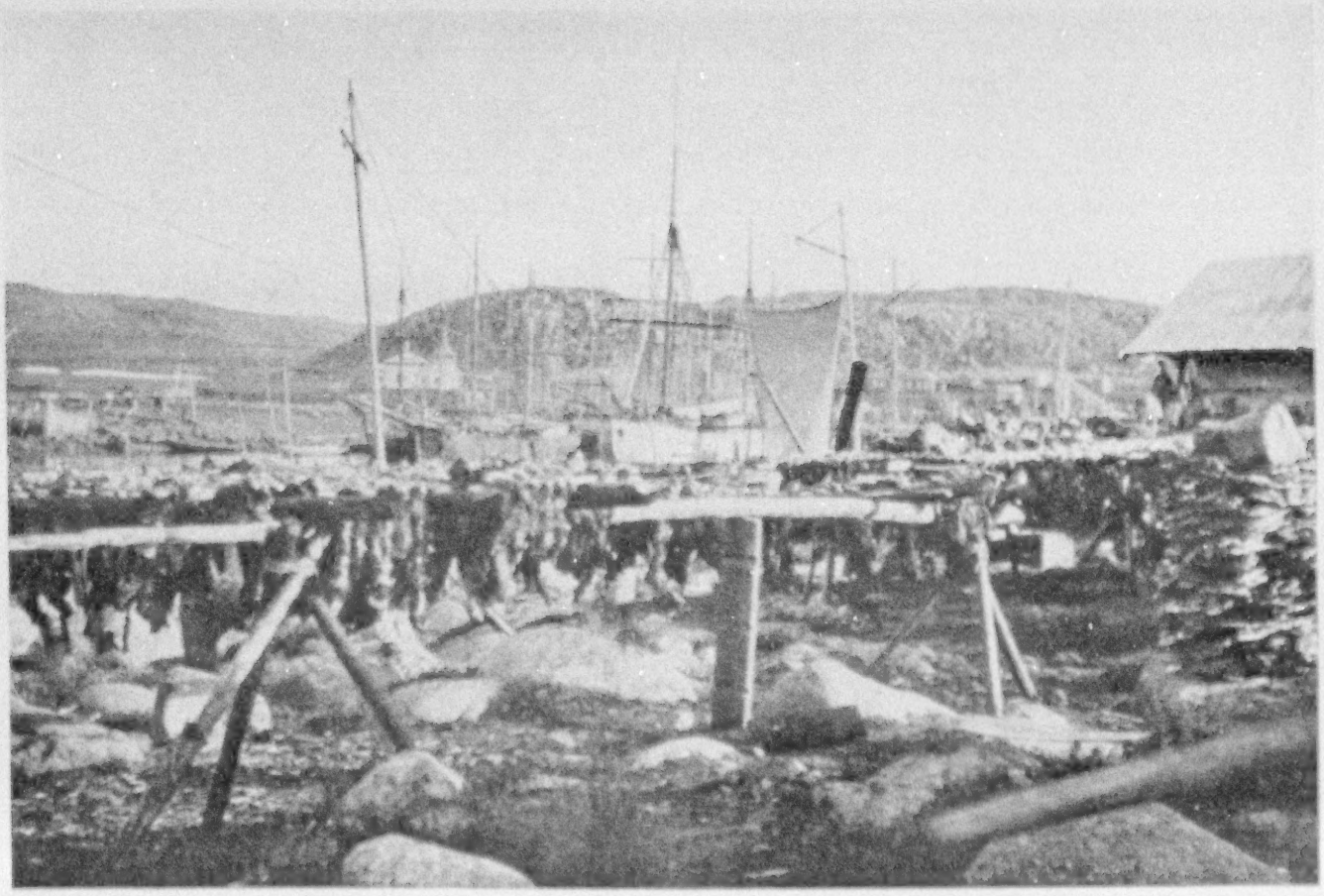
While the hauls of fish during the spring and summer on the Murman Coast are extraordinarily heavy, much of the catch is wasted, owing to improper methods of cleaning, drying, and salting. For this reason a large part of Russia's sea food is imported from Norway. Many fishermen in the early spring sail to Tromsö and Hammerfest, Norway, with their schooners loaded with flour, which they exchange for Norwegian fish, while much of their own bountiful catch is permitted to spoil.

XUM



ON THE BLEAK TUNDRAS OF ARCTIC RUSSIA

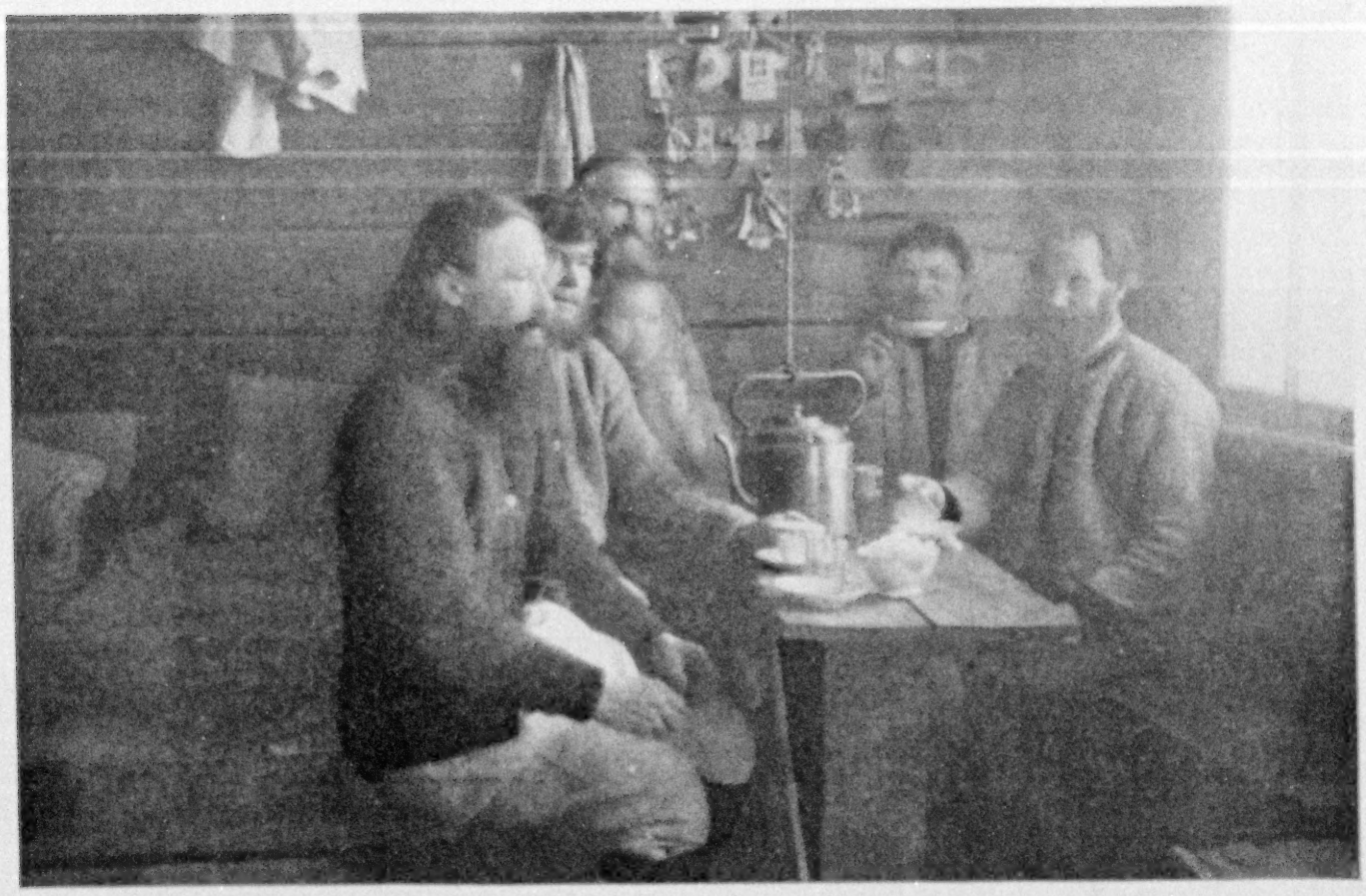
Many years ago the Russian Government made a brave effort to colonize this part of its vast domain, but the attempt proved abortive. The colonists cut away even the sparse woods which the region supported and introduced vodka among the native Lapps. The result was mutually tragic.



Photographs by Nathalie Loubovitsky

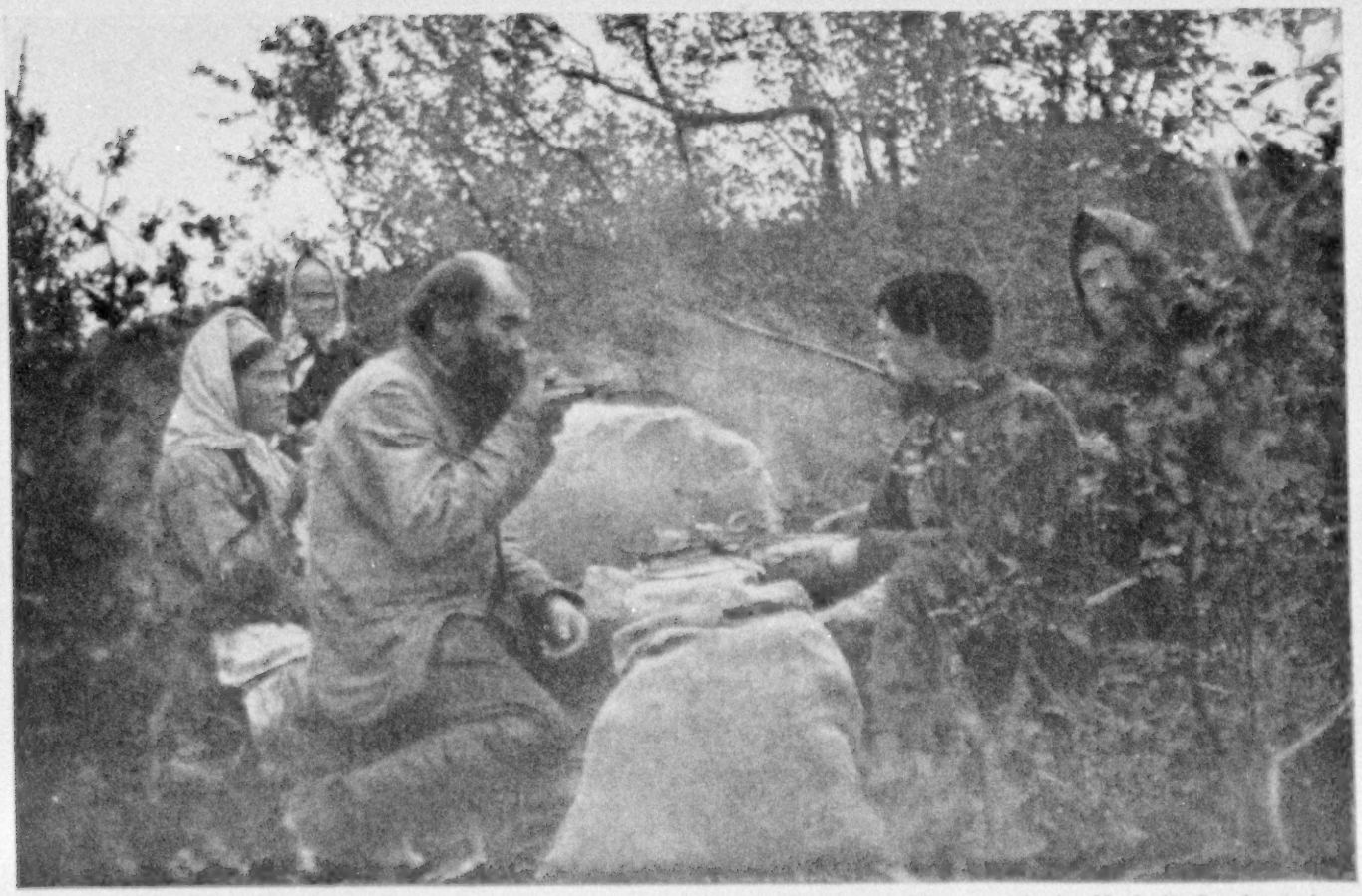
CODFISH HUNG OUT TO DRY AT A POPULOUS FISHING SETTLEMENT ON THE MURMAN COAST

These villages, where only men are to be found, present a curious aspect in summer. The fisher-folk come and go, busy night and day repairing their tackle and cleaning their catch. It is a land of the midnight sun, but no tourists ever find their way to it.



AFTERNOON TEA IN ONE OF THE ARCTIC OUTPOSTS OF CIVILIZATION

These are men of Pechenga, a settlement situated on the Pechenga Inlet, 18 miles from the Arctic seacoast and 65 miles northwest of Murmansk, the terminus of the Murman Railroad. A new wagon road, built since the outbreak of the world war, connects Pechenga with Kyro, 100 miles to the southwest. From Kyro a fair road, over which an automobile has passed, leads to Kovaniemi, the northern terminus of the Finnish Railway which runs to Kemi, 65 miles distant, at the head of the Gulf of Bothnia (see map, page 332).



Photographs by Nathalie Loubovitsky

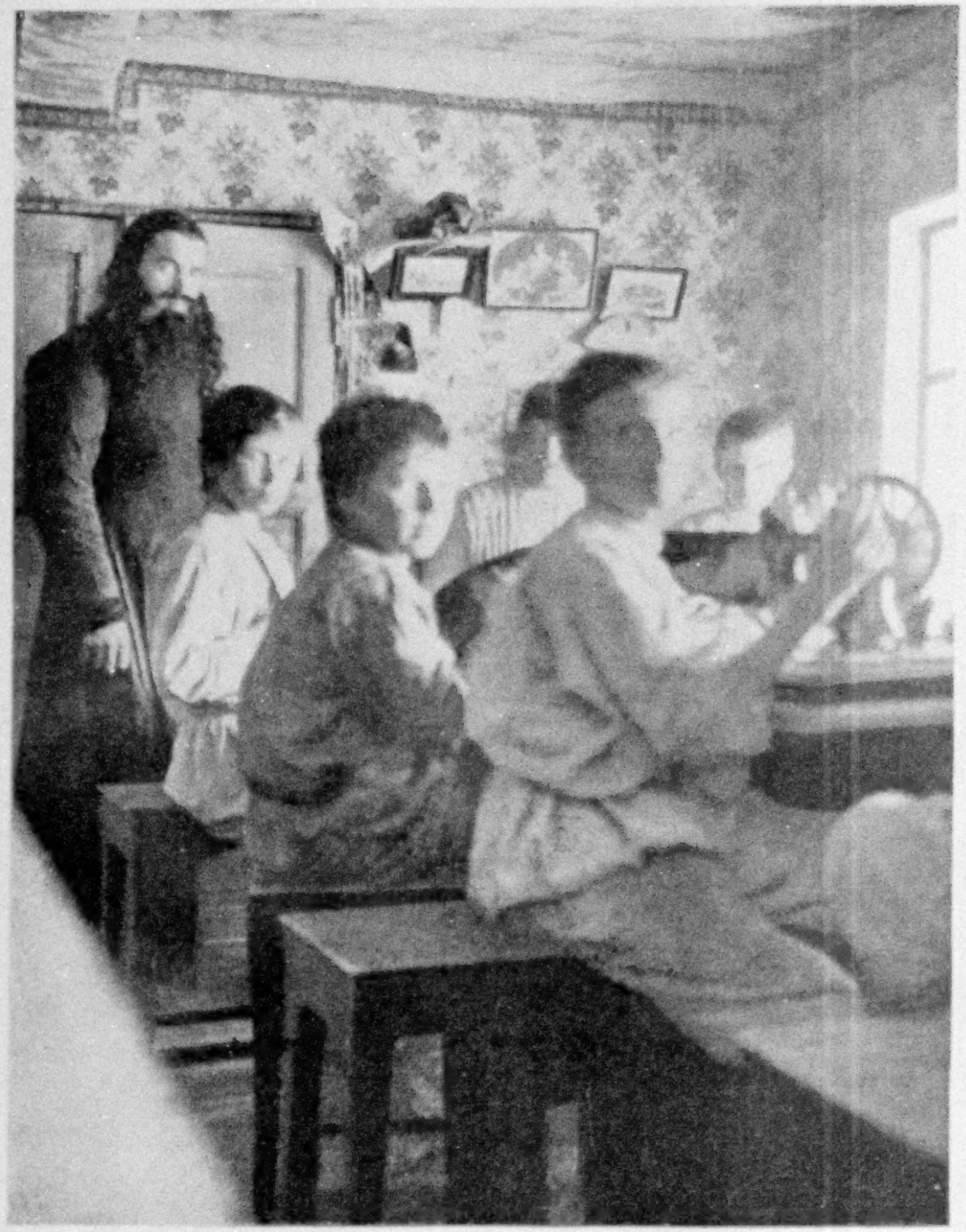
WE WOULD CALL THIS CAMPING OUT IN AMERICA, BUT IT IS THE STERN REALITY OF LIFE RATHER THAN RECREATION ON THE KOLA PENINSULA

When the old régime sent settlers to the Murman Coast, each family was promised 2,000 rubles as a household nest-egg, but even with this bonus the frugal peasants failed to find life attractive.

XUM

MONKS OF THE SOLOVETSKY MONASTERY AT PECHENGA

Founded in the sixteenth century by a hermit known as "Holy Trifan," the monastery was destroyed by a Swedish invasion early in the seventeenth century. In the nineteenth century it was restored under the direction of Father Jonathan, a simple peasant who spent thirty years at Pechenga and died in 1915, leaving the monastery as a powerful agency for civilization.



Photographs by Nathalie Loubovitsky

A TAILORING SCHOOL IN PECHENGA CONDUCTED BY MONKS

The pupils are placed in the monastery of this Murman settlement for a year or two at a time in fulfillment of religious vows made by their parents. Children came from places 1,000 miles distant before the world war. Pechenga is a fair-sized village with macadam roads. The wagon road to Rovaniemi (see also page 341) can be traveled at any time of the year, but is best in winter.

XUM

Photographs by Nathalie Loubovitsky

A LAPP AND HIS BEST FRIEND

What the banana is to the native of Central America and the palm tree to the dweller in the Saharan oasis, the reindeer is to the Lapp. This animal furnishes both food and clothing to his herder, and in addition is the native's sole means of transportation over miles of snow and ice.

A WELL-TO-DO WOMAN OF THE MURMAN COAST

The population of the Kola Peninsula is composed of two groups—the natives and the immigrants. The aborigines are Lapps. They are widely distributed, both on the coast and inland. While civilization has affected them only slightly, they are nominally Christians as the result of the efforts of Russian missionaries

HAY AND GRASS GROW ABUNDANTLY DURING THE BRIEF SUMMER MONTHS, WHEN THE SUN SHINES ALMOST CONTINUOUSLY "NIGHT" AND DAY

Most of the northern coast of the Kola Peninsula is a vast expanse of bogs, but where there is natural drainage the vegetation is luxuriant during the few weeks when the sun is constantly above the horizon. Small quantities of potatoes, rye, and barley are also raised.

Photographs by Nathalie Loubovitsky

A MONK OF PECHENGA (TO THE RIGHT) AND A WORKMAN EMPLOYED AT THE MONASTERY ROWING OUT TO MEET A PASSING STEAMER

The religious recluses in this outpost of Christianity derive some income from the down of the eider ducks which they gather on the near-by Aino Islands. The eider-down is collected without destroying the nests or frightening the birds.

XUM

"SUN-KIST" SEA FOOD ON THE MURMAN COAST

The natives have only two ways of preserving fish—to salt them in barrels and to dry them in the sun. When the salt supply runs low and the sun fails to shine, quantities of food spoil.

SNOW SISTERS ON THE KOLA PENINSULA

The winter lasts long and the spring is late, cold, and rainy in this part of the world. Snowstorms are not infrequent in June, and in mid-winter, in the forests, snowdrifts 15 and 20 feet deep are encountered.

Photographs by Nathalie Loubovitsky

THE CITY OF THE DEAD IN PECHENGA

Monuments erected to the monks of the famous Greek Church monastery founded by the "Holy Trifan" in the sixteenth century.

Photographs by Nathalie Loubovitsky

LADIES OF LAPLAND

The two women with the tall hats are married. Those with the scarfs are debutantes. The youngest, the one with the striped waist, is fifteen years of age. The Lapps are a semi-nomadic people, depending largely on their reindeer herds for food and winter clothing. They comprise a large element of the population of the Murman region.

FISHERMEN'S HUTS BUILT UPON SAND AND SNOW: MURMAN COAST

It matters not whether their foundations are shifting, as they are for use through the summer stay only.

Photographs by Nathalie Loubovitsky

THERE IS LITTLE TO ENLIVEN HUMAN EXISTENCE HERE—NOT EVEN A MOVIE EVER FLICKERS

The temperature sometimes rises to 80 or 90 in the shade in summer and will last for a week. Then a strong northeast wind sends the mercury down to 45 degrees. The temperature is affected by the icebergs which are brought down by the cold currents from the north.

began January 1, 1915, with the appointment by the Russian Government of Vladamir Goriachkovsky as the engineer. At his disposal were placed 100,000 workmen recruited from all parts of the empire.

The line had to run through a terrain presenting the most discouraging difficulties—swamps, bogs, frozen lakes, and almost impenetrable forests.

In Russia's peril, construction work could not wait upon the advent of spring. Soundings were made through the ice by means of long iron rods to determine earth contours, in order to establish the safest roadbeds in swampy country. Much of the surveying during the long nights of the Arctic winter had to be done by lantern light.

The German propaganda bureau spread reports of frightful mortality among the workmen, but as a matter of fact, although the laborers lived under the most primitive conditions, in tents, the death rate was extremely low. About one per cent of those taken ill succumbed to scurvy.

It is true that when the first trains began to run over the partly completed road there were occasions when the track suddenly subsided, due to the fact that the rails had been laid upon what were thought to be rocks, but which proved, with the thaw of spring, to be ice. Under the circumstances, however, these mishaps were comparatively rare, and no serious accidents resulted. The swampy character of the right of way is indicated by the fact that there are 1,110 bridges on the line.

To maintain American and Allied troops operating along the Archangel-Vologda line in the winter of 1918-1919, when the harbor of Archangel was sealed, supplies were shipped by steamer to Murmansk, where they were unloaded and sent by rail to Kandalaksha, a distance of 170 miles, and thence transported by sledges across the frozen White Sea to Archangel, 200 miles to the east.

MURMANSK'S DAY IN THE SUN

Even before the boom occasioned by the decision of the Allies and America to dispatch an expeditionary force to Russia, Murmansk had grown to be quite a settlement, with its 3,500 to 4,000 inhabitants augmented from week to week by refugees whose number fluctuated from a few hundred to 3,000.

As was the case with all building operations in the empire, the Russian Revolution interfered materially with the growth of the port, which is situated on the east bank of the Kola Inlet, 30 miles south of the Arctic shore. Most of the buildings are of one story and are constructed of unhewn logs, chinked with native moss. The streets under the Russian régime were entirely of dirt. On both sides of the inlet, which is one and a half miles wide at this point, hills rise to a height of several hundred feet. The harbor is unobstructed by hidden rocks or shoals, and the ship berths can accommodate the largest ocean-going freighters.

The Murman (a corruption of Norman) is the name given to the 260-mile stretch of Arctic seaboard which forms the northern boundary of the Kola Peninsula, a vast plateau having an average elevation of 1,000 feet and covered with swamps, peat-bogs, forests, and lakes, lying almost entirely within the Arctic Circle and embracing an area as large as England and Wales combined.

Before the war the Murman Coast was practically uninhabited throughout the greater part of the year. In summer, however, Lapps and Russian fishermen from Archangel and the Pomorya district (lying west of the White Sea) formed fishing communities to take advantage of the bountiful schools of salmon, cod, and herring off shore.

The Lapps live in the interior of the peninsula in winter, tending their herds of reindeer, which furnish them with food, clothing, and transportation. In times of peace there is a considerable lumber industry, but otherwise the peninsula is comparatively non-productive, as only the scantiest crops of rye, barley, potatoes, and hay can be grown. The animal life is similar to that of most other high latitudes, including foxes, bear, martens, otters, elk, deer, and hares.

Mosquitoes are a serious pest in summer, even the reindeer being forced to flee to the high ground of the Chibinski Mountains, near the middle of the peninsula, to escape the harassing swarms.

ON THE TRAIL OF A HORSE THIEF

By Herbert W. Gleason

YES, he was a genuine Horse Thief, and we followed his trail for over 100 miles. But we never caught up with him! Hence it may be well to advise the expectant reader, at the very outset, that this tale is utterly barren in respect to those exciting episodes in which six-shooters are wont to play a prominent part, ending with a limp figure strung up to a tree.

There were two reasons why we never caught up with the Horse Thief. First, he had twenty years the start of us; and, secondly, we hadn't the remotest interest in the Horse Thief himself, even if at any time we had been close upon his heels; but we were tremendously interested in his trail.

THE COURSE OF THE MIGHTY COLUMBIA

The Columbia River is a mighty stream, and throughout its entire length of 1,400 miles it possesses a variety and depth of interest hardly to be surpassed by that attaching to any other river on earth. Although only half as long as the Mississippi, so many and so important are its tributaries that it fairly equals the latter stream in the volume of water which it pours into the ocean.

Few great rivers follow so devious a course. Rising in the Kootenay District of British Columbia, it first flows in a northwesterly direction for 200 miles; then it makes a sharp bend and flows due south for nearly 300 miles, halting on the way to form the famous Arrow Lakes; next it crosses the International Boundary into the State of Washington, where, for a distance of 600 miles, it turns and twists toward every point of the compass, as if it were seeking to bestow the blessing of its waters upon every portion of the great "Inland Empire," as the fruitful plains of eastern Washington are called.

Just before reaching the Oregon boundary it receives the waters of the Snake River, whose source lies 950 miles away in Yellowstone Park.

Then, with its breadth increased in many places to a mile or more, it follows a general westerly course for 300 miles, forming the dividing line between Oregon and Washington, and finally, as it approaches the ocean, it broadens out into a superb bay, 25 miles long and from 5 to 9 miles wide, ever maintaining its current against the ocean tides, although the influence of the tides is felt as far back as the Cascades—160 miles from its mouth.

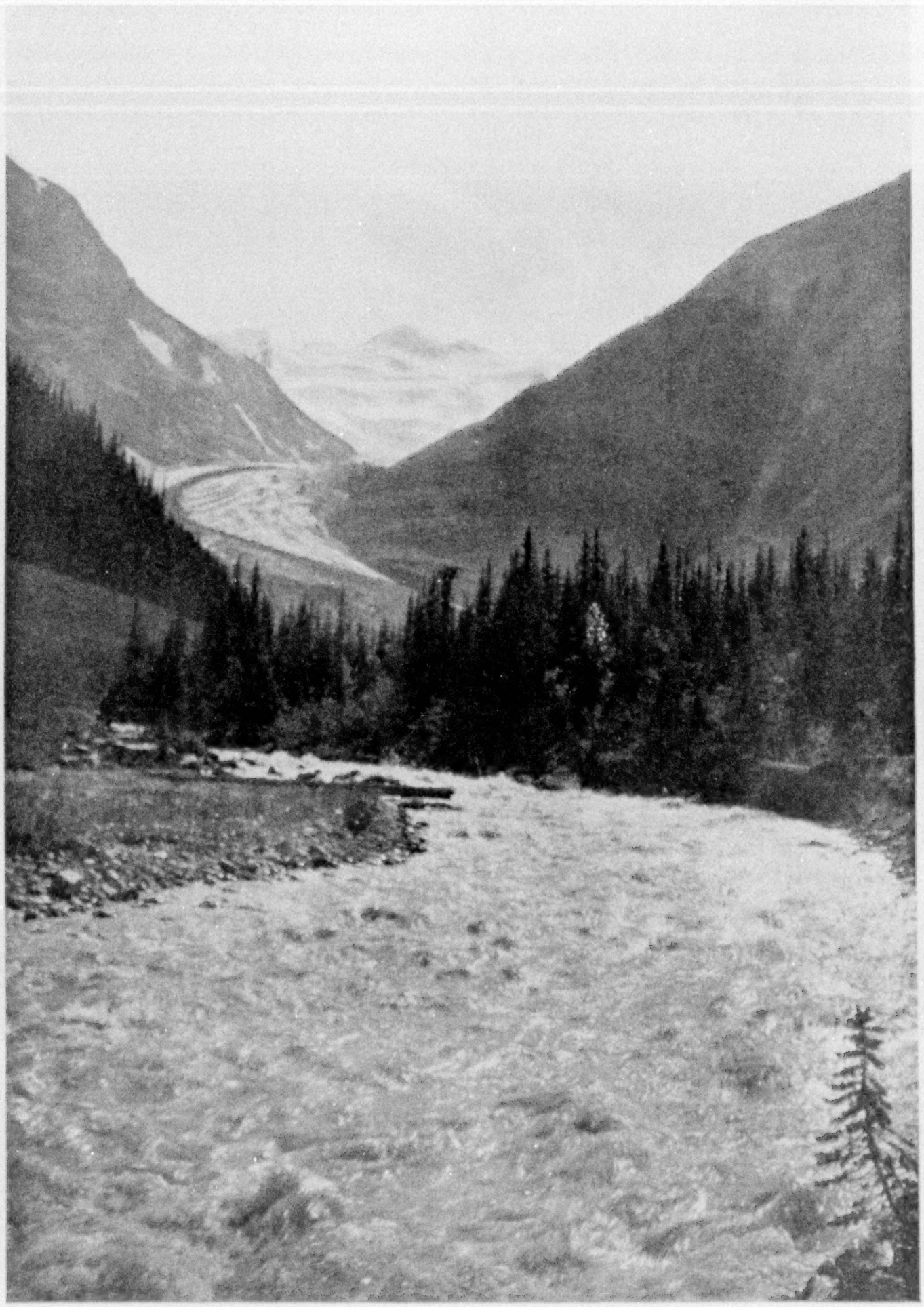
Around this lower stretch of the Columbia there clusters a wealth of romance, Indian legend, historical interest, and heroic commercial enterprise. Here, too, the scenic beauty of the river, which is marked throughout its entire course, reaches its climax. Right through the lofty Cascade Range the river cuts its way—a feat which no other river for a distance of 1,200 miles along the range is able to accomplish.

To one traveling by steamer over this portion of the river, or speeding along the newly completed Columbia Highway by automobile, there is unfolded a continuous panorama of marvelous beauty. The Dalles, Celilo Falls, Castle Rock, Cape Horn, Multnomah Falls, Rooster Rock, the Cascades, Oneonta Gorge, Table Mountain, St. Peter's Dome—these are but a few of the many points of interest which delight the eye and uplift the soul.

AN EXPLORER THREE MONTHS TOO LATE

Crowning all, there are the three great "Guardians of the Columbia," as they have been called—Mt. Hood, Mt. Adams, and Mt. St. Helens—huge extinct volcanoes (or possibly they are only slumbering), whose snowy crests pierce the azure at elevations from 10,000 to 12,000 feet above the sea.

Now, the Lower Columbia, with its historical associations, its scenic grandeur, its thriving cities, its extensive fisheries and fruit ranches, has long been famous; but it is only within a few years that the



Photograph by H. W. Gleason

AT THE HEAD OF HORSE THIEF CREEK (SEE PAGE 352)

Proceeding from an enormous glacier which reaches far back into the mountains, the "creek" is a full-fledged mountain river at its very birth.

region around the *source* of the river has received any public attention. To be sure, David Thompson, the noted English explorer, spent a winter on Lake Windermere as long ago as 1810 and built there a fort to defend himself against the Indians—an event of no slight historical importance; for Thompson, whose purpose was to establish English interests in control of the Columbia, descended the river the following season only to find, when he arrived at the mouth of the river, the American flag waving at Astoria. He was three months too late.

Although Thompson afterward wrote an account of his Windermere sojourn and made a rough map of the neighboring region, nearly a century elapsed before the Upper Columbia Valley was known to any except a few ranchers and adventurous miners. Only within several years past has it been possible to reach the valley by railroad, and no detailed map of the country has as yet been made.

THE SOURCE OF THE COLUMBIA

The Columbia River finds its source in two lakes—Lake Windermere and Upper Columbia Lake—which lie in the broad basin separating the main range of the Rocky Mountains from the Selkirks at a point about 80 miles north of the International Boundary. The valley here trends north and south and is some three or four miles wide, being flanked on the east by the foothills of the Rockies and on the west by outlying summits of the Southern Selkirks—sometimes called the Purcell Range. Each range is pierced by deep canyons, through which flow jubilant mountain streams that seem glad to add their volume to the flood of the Columbia.

The floor of the valley is remarkable for its park-like character. The larger trees—mostly Douglas spruce and yellow pine—never form forests, but stand apart, each with plenty of room, while the aspens and alders and various shrubs are grouped gracefully here and there, with a profusion of wild flowers occupying the open spaces.

This park-like aspect is naturally much enhanced by the lake scenery. The two lakes are nearly equal in size, each covering an area of four or five square miles. Lake Windermere is the more picturesque of the two, its winding shores being emphasized by a series of bluffs, prettily terraced, which rise 50 feet or more above the level of the lake (see page 353). The Upper Lake, a few miles farther up stream, is the real beginning of the Columbia.

Both lakes are charming in outline, and present, under varying conditions of storm and calm, sunlight and shadow, a never-ending succession of pleasing effects. Seldom does one find a combination of mountain, lake, and open woodland so profoundly appealing and so commandingly beautiful. Especially noteworthy are those days when there is a gathering of the clouds, now on one range and now on the other.

Such variety in form, such majesty and yet delicacy of outline, such pearly transparency—and then again such leaden density—of substance, such brilliant illumination, such marshaling of glory—it is all beyond the power of words to describe.

The climax of beauty, however, comes in the early fall season, when the trees and shrubs have donned their brightest raiment and there is a riot of color throughout the valley and on the parallel slopes of the mountains—save on the extreme summits where rests a coverlet of new-fallen snow.

DAYS OF HOLY CALM

Day after day of holy calm prevails. The winds have ceased even their whispering, and the lake surfaces reflect with startling exactness every feature, whether of form or color, of the surrounding landscape. One standing by the lake shore at such a time may almost hear the antiphonal chant of rejoicing flung across the valley from one mountain range to the other, and sodden indeed must be the soul which does not feel itself uplifted by the supernal beauty.

As indicated above, the iron horse has at last found its way to the Upper Columbia Valley. Previously the trip was made by steamer from the town of Golden, on the main line of the Canadian

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Pacific Railway. And what a trip that was! Only some 85 miles in total distance, it consumed the better part of two days' time; for the little river steamer, flat-bottomed and with a draft so light that it could pass over sand bars which were covered with only a few inches of water, was at the mercy of the persistent and tortuous current, with the result that it would frequently poke its nose now into one bank and now into the other, in utter disregard of helm and helmsman.

Even so, to the traveler delighting in Nature's beauty the trip was over all too quickly; for the magnificent double panorama through which the steamer passed—the Rockies on one side and the Selkirks on the other, their lofty summits clad in perpetual snow and their steep escarpments tinted with ochres and purples, and even vermilion—formed a vision of ceaseless charm.

More than one voyager has declared that this trip up the Columbia far exceeds in beauty anything which the Rhine has to offer. If one can afford the time, by all means let the journey be made by steamer. Next to that, by automobile.

A splendid road has recently been constructed by the provincial government through the entire valley, and still another automobile highway, of wonderful scenic interest, has been built over the mountains from Banff to Lake Windermere.

THE TRAGIC STORY OF HORSE THIEF CREEK

It was in this region that we followed the Trail of the Horse Thief. We were told that some score of years previous, after gathering his four-footed plunder, he had gone up the valley and then turned westward into one of the side canyons, intending to take his horses over the mountains and down into Montana.

But on reaching the head of the canyon he found his way barred by lofty mountains, hung with tremendous glaciers. Caught in this cul-de-sac, he was easily apprehended by the officers of the law, who dealt with him according to his deserts and restored the horses to their rightful owners. Ever since, the stream which flows through the canyon by which he sought to make his escape has been known as Horse Thief Creek.

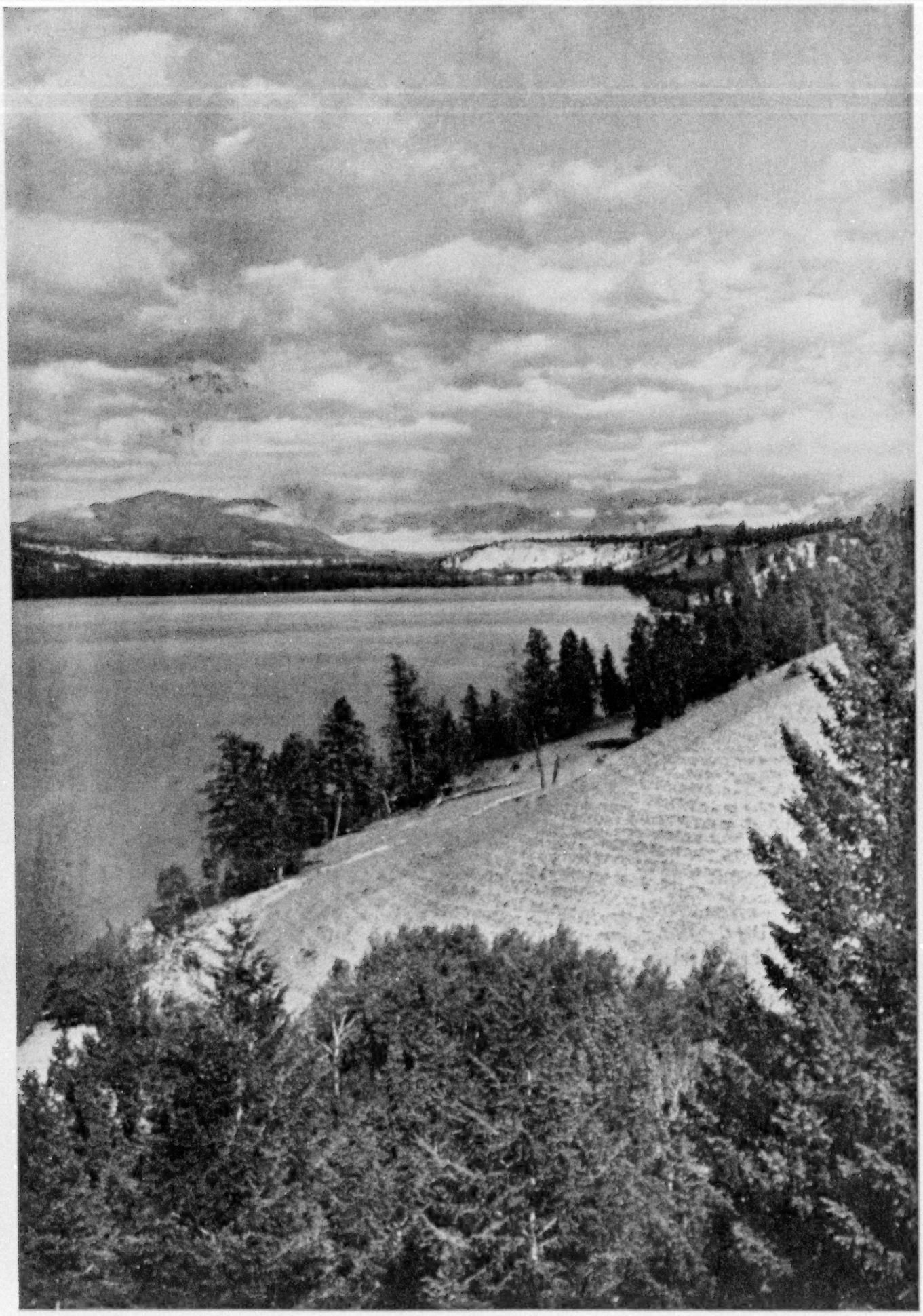
One bright day in August a party of four of us arrived at Lake Windermere. For two or three days we gave ourselves up to the enchantments of the lake and its surroundings; and then, with saddle horses and pack outfit, we started up Horse Thief Creek. Entering the canyon, we found ourselves on a high bench overlooking the stream, whose volume and roar seemed to belie the appellation of "creek." It was really a huge mountain torrent, in places 30 or 40 yards wide and tossing its waves in the unbridled energy of its current (see page 350).

A BATTALION OF "HOODOOS"

Evidences of its activity in sculpturing the walls of the canyons were everywhere apparent. In one place there was a regular battalion of "hoodoos"—fantastic pinnacles of mixed clay and gravel, the result of a curious process of erosion. In another place the river found its way through a narrow gorge, with vertical walls 300 feet deep. Now and then we caught a glimpse of a waterfall or boiling cascade—indeed, there were but few quiet places along the lower stretch of the river.

As we approached the head of the canyon, after passing through an extensive forest of mountain hemlock and fir, we suddenly came out upon a scene of rare sublimity. Here was a great amphitheater, surrounded by noble peaks belonging to the highest crest of the Selkirks, their lower slopes clad with a luxuriant dark-green forest, while from their snow-enshrouded summits descended here and there sparkling glaciers of utmost purity.

Wonderful above all else was the magnificent ice-stream which coursed down from a vast snow-field directly in front of us. Swinging from behind a rocky promontory in the form of a gigantic letter "S" it came down to the very floor of the valley—obviously the main source of the river whose course we had been following—while towering above all was a superb "snow dome" of dazzling whiteness. And there was music all around us. Standing in one spot, we counted no less than eight distinct waterfalls leaping



Photograph by H. W. Gleason

BLUFFS ALONG SHORE, LAKE WINDERMERE (SEE PAGE 351)

The winding shores of Lake Windermere are emphasized by a series of bluffs, prettily terraced, which rise from the lake level.

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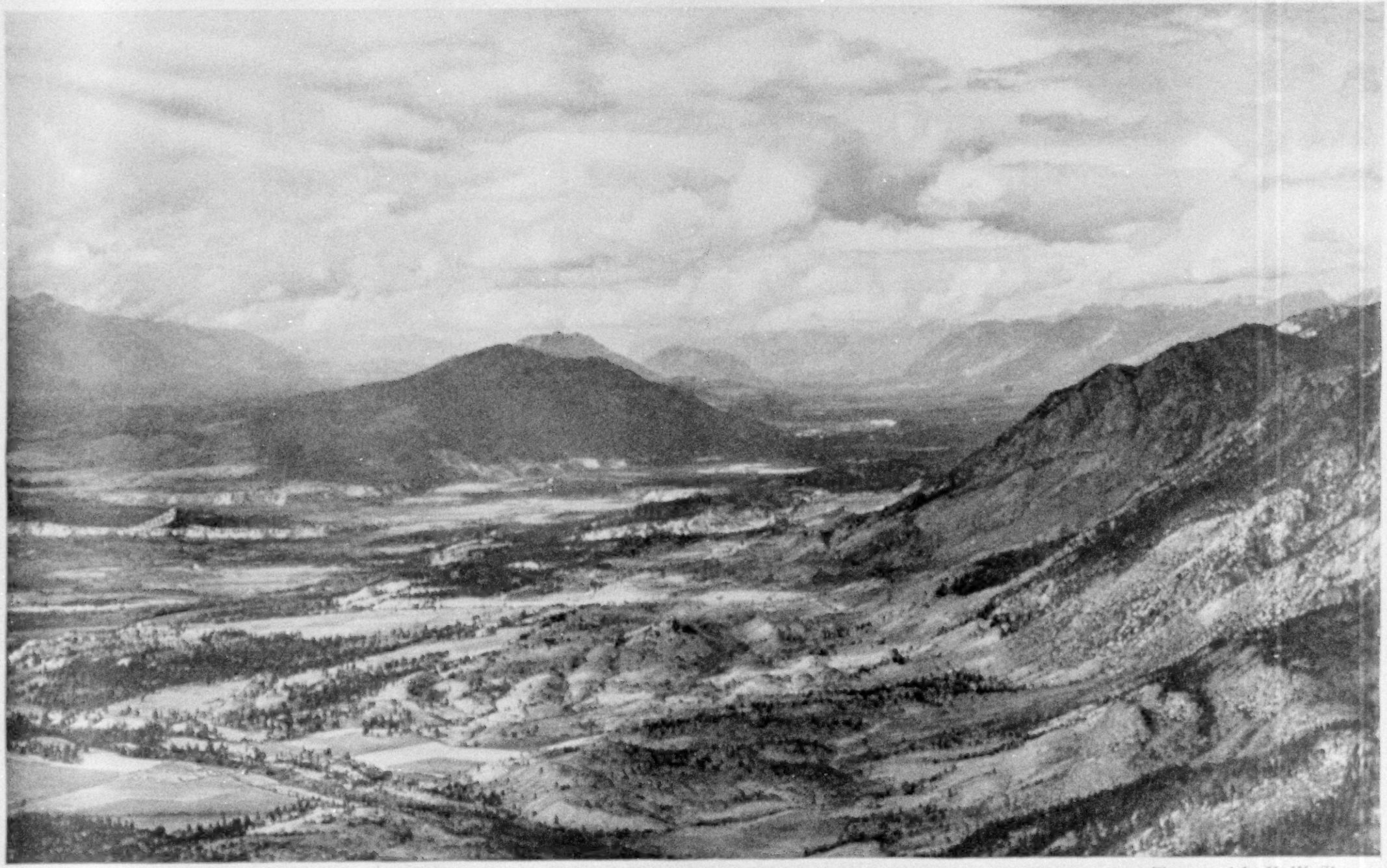

Photograph by H. W. Gleason

UPPER COLUMBIA VALLEY, LOOKING NORTH FROM SWANZEY PEAK

The Upper Columbia Valley trends north and south, separating the main range of the Rocky Mountains from the Selkirks. This view is taken from one of the higher foothills of the Rockies overlooking the valley.

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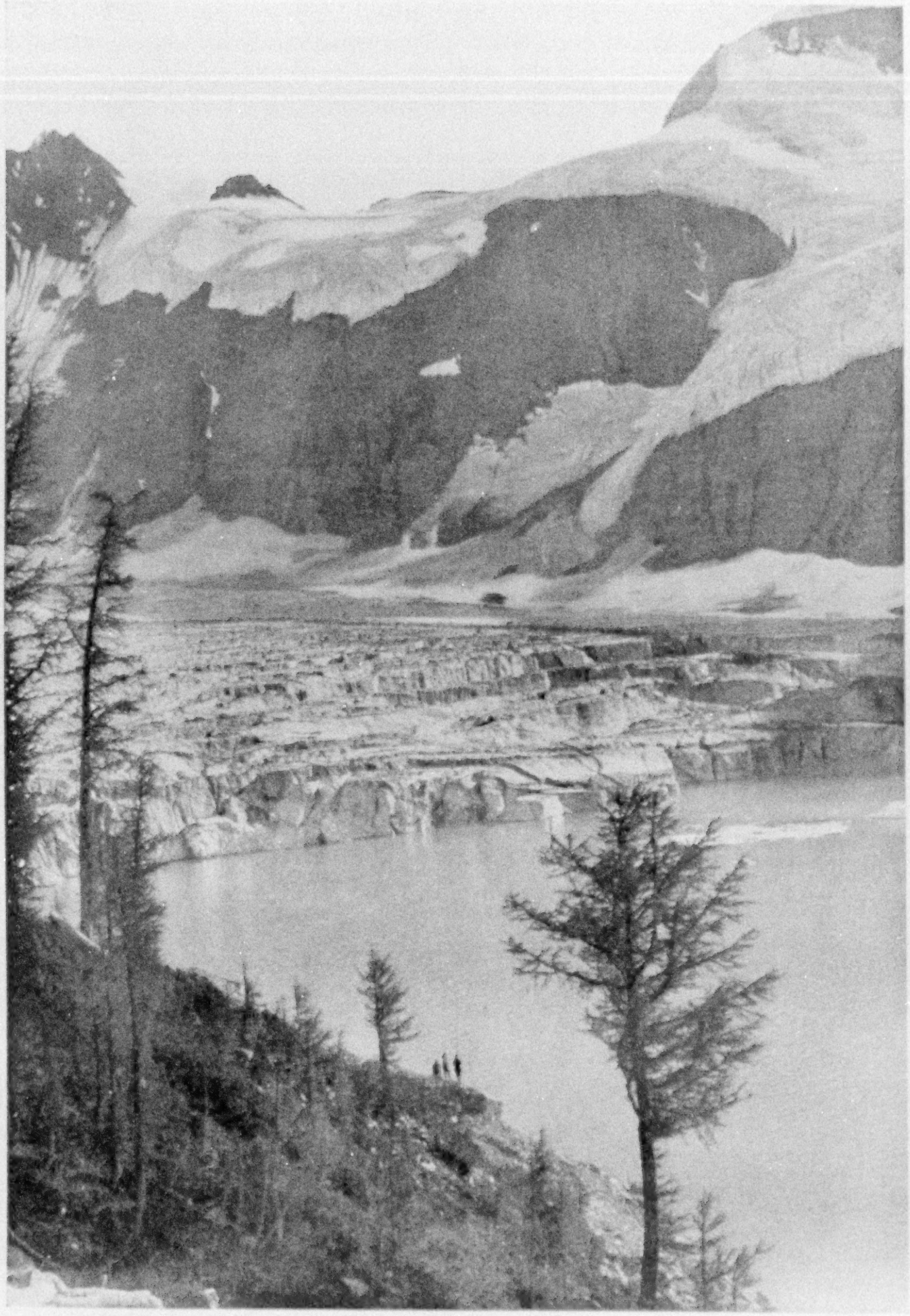
Photograph by H. W. Gleason

LYALL'S LARCHES AT LAKE MAYE: COLUMBIA RIVER REGION

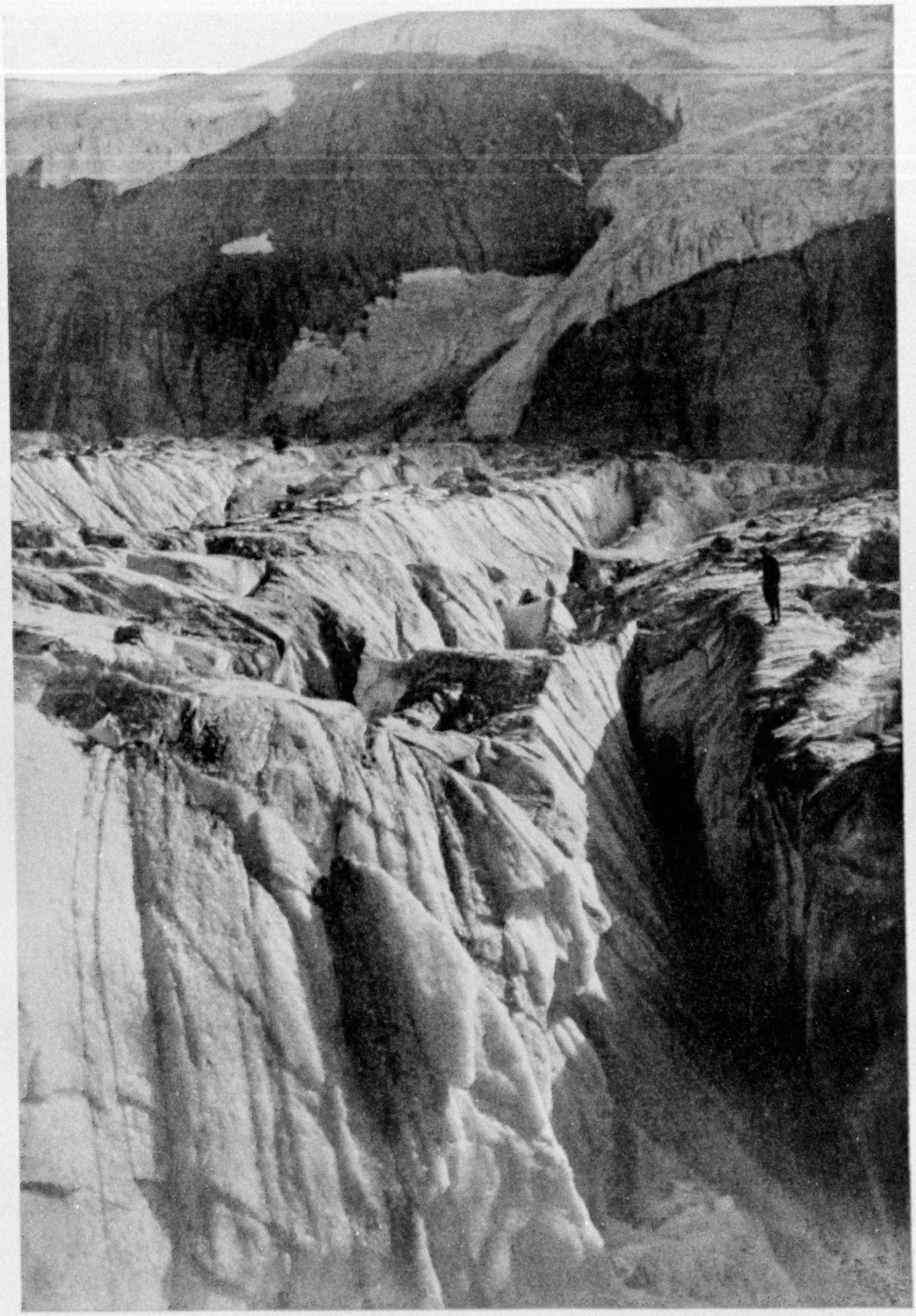
Lake Maye is a lovely sheet of water, pearly blue in color, about two miles in length and a mile in width, completely surrounded—except on the north side—by majestic mountains bearing a whole series of superb glaciers, from whose fissures and crevasses gleam sapphire tones of exquisite beauty. Directly opposite, across the lake, there is a magnificent piedmont glacier, fully a mile wide, with a notable medial moraine and a long succession of transverse crevasses. From this glacier, which comes down into the lake, there occasionally break off great blocks of ice, accompanied by a thunderous roar, and the icebergs, as they float around the lake, often present quaint and curiously sculptured forms.



Photograph by H. W. Gleason

FOOT OF PIEDMONT GLACIER, LAKE MAYE

At the head of Lake Maye there lies this splendid example of a piedmont glacier—the active agent in byegone ages in carving out the immense amphitheater in which it is located.



Photograph by H. W. Gleason

AMONG THE CREVASSES ON PIEDMONT GLACIER ABOVE LAKE MAYE

"Some of the crevasses we could jump across, but more often there was the necessity of making long detours around the ends of the yawning chasms. In many cases these crevasses were of appalling depth, and while we could not but admire the wonderful azure of their deep, converging walls, they all evinced a certain receptive attitude which was somewhat disconcerting to a 'tenderfoot' and led us to be extremely alert in negotiating slippery places. Happily the glacier was 'dry'—that is, not covered with fresh snow, which often conceals the jaws of the crevasses and makes crossing a glacier exceedingly hazardous—so that all possible danger was perfectly obvious and readily avoided."

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from the heights above and cascading to the river in a chorus of joyous song.

Camp was soon made on a grassy plot by the river bank, sheltered by a grove of young firs and close to a delicious spring of clear, cold water. From here we made many excursions to glacier and mountain top.

One morning we took an early start by candle light, ascended the great Horse Thief Glacier, and after some hours of hard work, enlivened by many interesting episodes, succeeded in reaching the summit of a high peak that had attracted us for several days.

This was clearly the first time human feet had ever stood upon the summit, and we were rewarded with a view of alpine grandeur rarely equalled. In every direction, as far as the eye could reach, there extended a perfect ocean of snow-capped peaks, ranging from 10,000 to 12,000 feet in altitude—nameless, nearly all of them.

Realizing that any one of these thousands of peaks, if it were standing in the neighborhood of a great city, would be famous the world over, and that a great part of the region in the midst of which we stood was still awaiting exploration, we felt almost as if we were discoverers of a new continent. Unfortunately, forest-fire smoke, which had crept in during the night, dulled to a considerable degree the clearness of the view and rendered our cameras useless.

From careful aneroid measurements, we calculated the height of the mountain to be about 11,200 feet. We named it "Mt. Bruce," after a leading citizen of Windermere Valley.

Our chief object on another excursion was to climb Mt. Jumbo—a feat which no one had ever accomplished.

Starting as usual, before daybreak, we scrambled over the lower slopes of Jumbo Glacier without much difficulty, but before long we found ourselves entrapped in a maze of seracs, or ice pinnacles, which compelled slow and very careful progress. This caused us to take to the rocks, and at length, with the aid of the rope, we succeeded in reaching the steep rocky slope to the left of the glacier and then on to the summit of the ridge.

Arrived here, the bright sunshine with which we had thus far been favored seemed inclined to desert us, and ominous clouds were seen rising in the southwest. We chose to push on, however, for from this point it was simply a long pull across the snow-field to the base of the final peak. So we roped up and started. For an hour we made rapid progress, carefully avoiding the many concealed crevasses and feeling confident of attaining our goal.

But meanwhile the clouds had been gathering in increasing array, and when within only half an hour of the final summit a terrific blizzard struck us full in the face. Enveloped in a blinding snow, driven by the wind, it was impossible to stand against it or even to see our way more than a few feet ahead.

There was no possible alternative. We simply had to turn our backs to the storm and retrace our steps across the snow-field—defeated!

Such an experience, while disappointing, is to the true mountaineer simply "a part of the game," and he looks for better luck next time. But the "next time" did not come for us on this trip. For three days we lingered in camp, waiting in vain for the clouds to clear away.

But the weather as a whole continued decidedly unfavorable, and meanwhile a vast quantity of fresh snow had fallen on the mountain tops, making high-altitude trips quite out of the question. So we regretfully packed up our belongings and hit the trail back for "civilization."

"Going to the mountains is going home," was a favorite phrase with John Muir, the beloved evangelist of outdoor life, and from this text he was wont to preach most eloquently and convincingly. Happy are those who have discovered this truth; for it means not merely physical recreation and esthetic delight, but a keen mental stimulus—a new sense of the real values of life and a blessed inspiration toward better things.

America possesses exhaustless resources for those who are desirous of "going home," and some of the greatest and most satisfying of these are to be found in the region where we followed the Horse Thief Trail.

THE TEN THOUSAND SMOKES NOW A NATIONAL MONUMENT

The President of the United States Sets Aside for the American People the Extraordinary Valley Discovered and Explored by the National Geographic Society

THE members of the National Geographic Society have occasion for much gratification in the fact that President Wilson has created the Katmai National Monument, embracing an area of 1,700 square miles in Alaska, as the result of the five expeditions which the Society sent to this region for the purpose of studying the effects of the great Katmai volcanic eruption in 1912.

The findings of the National Geographic Society's expeditions, published in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1913, January, 1917, and February, 1918, comprise all that is known about this remarkable region which Prof. Robert F. Griggs, leader of the 1915, 1916, and 1917 expeditions, has described as one of the greatest wonders, if not the greatest, of the natural world.

The Valley of Ten Thousand Smokes, an awe-inspiring phenomenon, where the processes of Nature in the creation of areas suitable for man's habitation may be studied as they can be in no other spot on earth, was discovered and named by Professor Griggs' party in 1916. The next year it was partially explored. During 1919 it is hoped that this monumental research work can be completed (see page 366).

AMERICA'S GREATEST NATURAL-WONDER PLAYGROUND OF THE FUTURE

Realizing that when means of transportation are improved, the Katmai territory will become the great natural-wonder playground of America, President Wilson, on the recommendation of the Secretary of the Interior, Franklin K. Lane, and of the Director of the National Park Service, Stephen T. Mather, has set it aside for all the people for all time in the following proclamation:

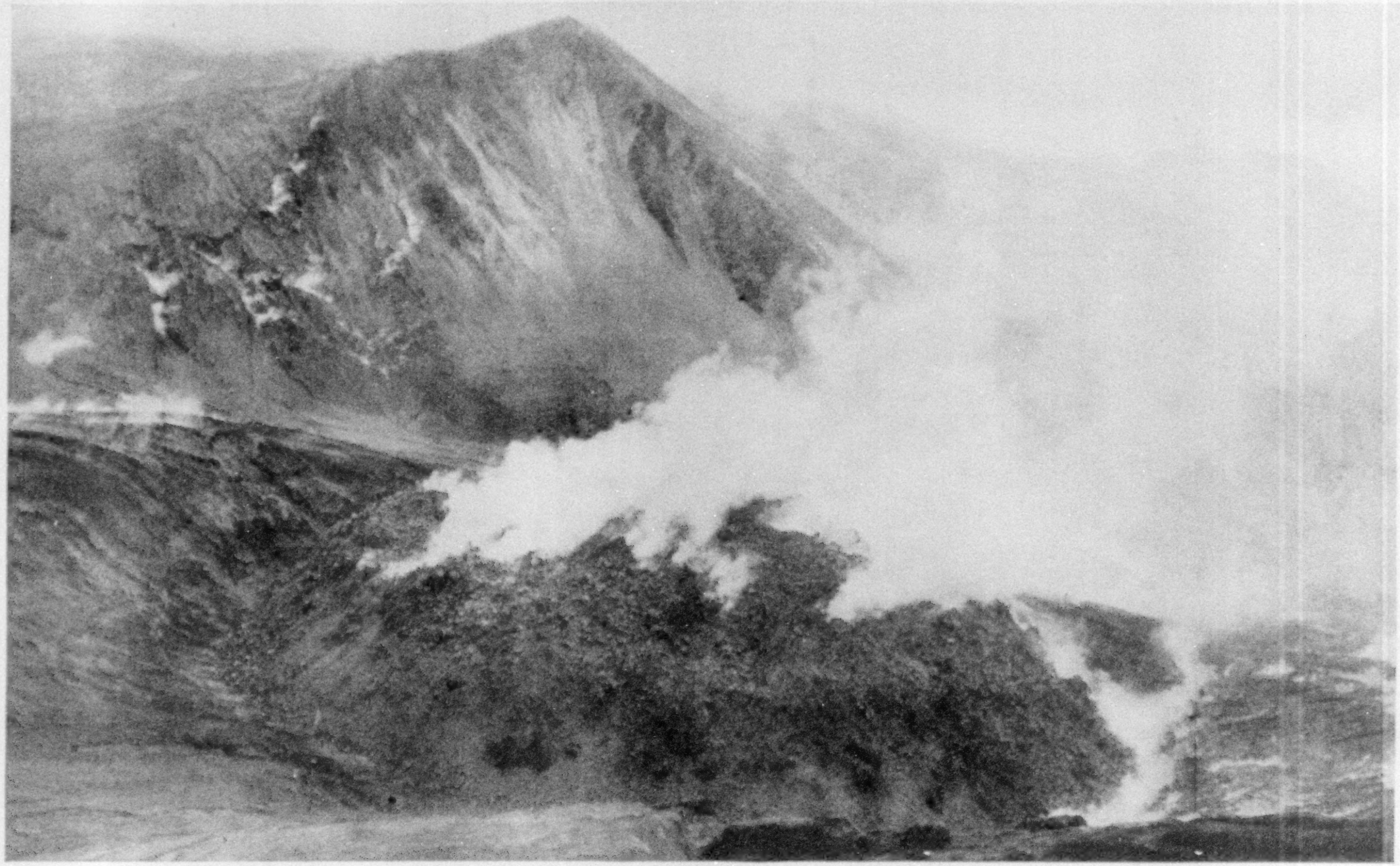
WHEREAS, There exists upon the southern coast of Alaska a belt of unusual volcanic activity which has during the last several years exhibited at various points energy of a violence which attracts the special attention of scientific watchers,

AND WHEREAS, Mount Katmai, one of the volcanoes in this belt, has proved upon investigation to have unusual size and character, and to be of importance in the study of volcanism, inasmuch as its eruption of June, 1912, was one of excessive violence, ranking in the first order of volcanic explosive eruptions and emitting several cubic miles of material during its first three days of activity,

AND WHEREAS, The results of this eruption are still fresh, offering excellent opportunities for studying the causes of the catastrophe and its results and affording a conspicuous object-lesson in volcanism to visitors interested in the operation of the great forces which have made and still are making America,

AND WHEREAS, The volcanic neighborhood is shown by the explorations of the National Geographic Society to contain many other striking features of an active volcanic belt produced so recently that they are still in the formative stage; and in particular The Valley of the Ten Thousand Smokes, a valley of hot springs in a condition of development toward a possible future geyser field, in distinction from the present dying geyser field of the Yellowstone,

AND WHEREAS, This wonderland may become of popular scenic, as well as scientific, interest for generations to come, inasmuch as all its phenomena exist upon



Photograph by Paul R. Hagelbarger

NOVARUPTA AND FALLING MOUNTAIN IN 1918

No change during a year's interval could be detected. Throughout the three years since its discovery, Falling Mountain has continued to send great boulders bouncing down its precipitous slopes in such rapid succession that one avalanche of galloping boulders hardly reaches the bottom before another breaks loose from the summit. Never has an observer had to wait five minutes for a new discharge.

a scale of great magnitude, arousing emotions of wonder at the inspiring spectacles, thus affording inspiration to patriotism and to the study of Nature,

NOW, THEREFORE, I, WOODROW WILSON, President of the United States of America, by virtue of the power and authority in me vested by section two of the Act of Congress entitled "An Act for the Preservation of American Antiquities," approved June 8, 1906 (34 Stat., 225), do proclaim that there are hereby reserved from all forms of appropriation under the public-land laws, and set apart as the Katmai National Monument, certain lands particularly described as follows, to wit, beginning at the United States Coast and Geodetic Survey triangulation station, latitude 57° 52′ 17.040″, longitude 155° 05′ 20.331″, established in 1908 about one-half west of Katmai Bay on top of a hundred-foot bluff on the Alaska Peninsula, named Cape Kubugakli; thence north 40° 00″ west to the intersection with longitude 155° 40′; thence due north to the intersection with latitude 58° 35′; thence due east to the intersection with a line bearing north 60° 00′ west from Cape Gull; thence south following said line to the shoreline at Cape Gull; thence west following the shoreline of the coast to a point directly below the triangulation station, situated on the bluff at Cape Kubugakli; thence up the bluff to the said station, the point of beginning; embracing approximately 1,700 square miles of land, as shown upon the diagram hereto attached and made a part of this proclamation.

Warning is hereby given to all unauthorized persons not to appropriate or injure any natural feature of this monument or to occupy, exploit, settle, or locate upon any of the lands reserved by this proclamation.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have the supervision, management, and control of this monument, as provided in the Act of Congress entitled "An Act to Establish a National Park Service, and for other purposes," approved August 25, 1916 (39 Stat., 535).

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done in the District of Columbia this twenty-fourth day of September in the year of our Lord one thousand nine hundred and eighteen, and of the Independence of the United States of America the one hundred and forty-third.

WOODROW WILSON.

By the President:
ROBERT LANSING, *Secretary of State.*

PREËMINENT AMONG THE WONDERS OF THE WORLD

All subsequent study and comparison confirms and deepens the opinion expressed in the accounts of the discovery of the Valley of Ten Thousand Smokes, that this and the associated volcanic phenomena stand preëminent among the wonders of the world. Search through the literature of volcanoes, and conversation with travelers who have visited all the show places of the earth, make it quite certain that nowhere else in the present-day world is there anything at all similar to this supreme wonder.

The unique character of the Ten Thousand Smokes is generally recognized by those who have given the matter consideration. But how long will they last? Are the vents really the chimneys by which exit is found for the emanations from a vast mass of molten magma that, having risen from the depths, has all but burst through the surface bodily? Or, are they due merely to the vaporization of surface water by the heated products of the great eruption? Are they likely to endure for a long time, or will they probably dwindle rapidly, as nature settles down again after the great cataclysm of 1912?

So far as the observations of a single year could do so, the studies of 1917 indicated that they were real volcanoes, whose probable life was to be measured by decades rather than by days or months. But no single season's work could settle these questions. It was considered highly important that a watch be kept on developments the succeeding year. Notwithstanding the absorption of every one's energies in the prosecution of the war last summer, it was considered advisable, therefore, to keep some record of their condition. Two members of the expedition of 1917, Jasper D. Sayre and Paul R.

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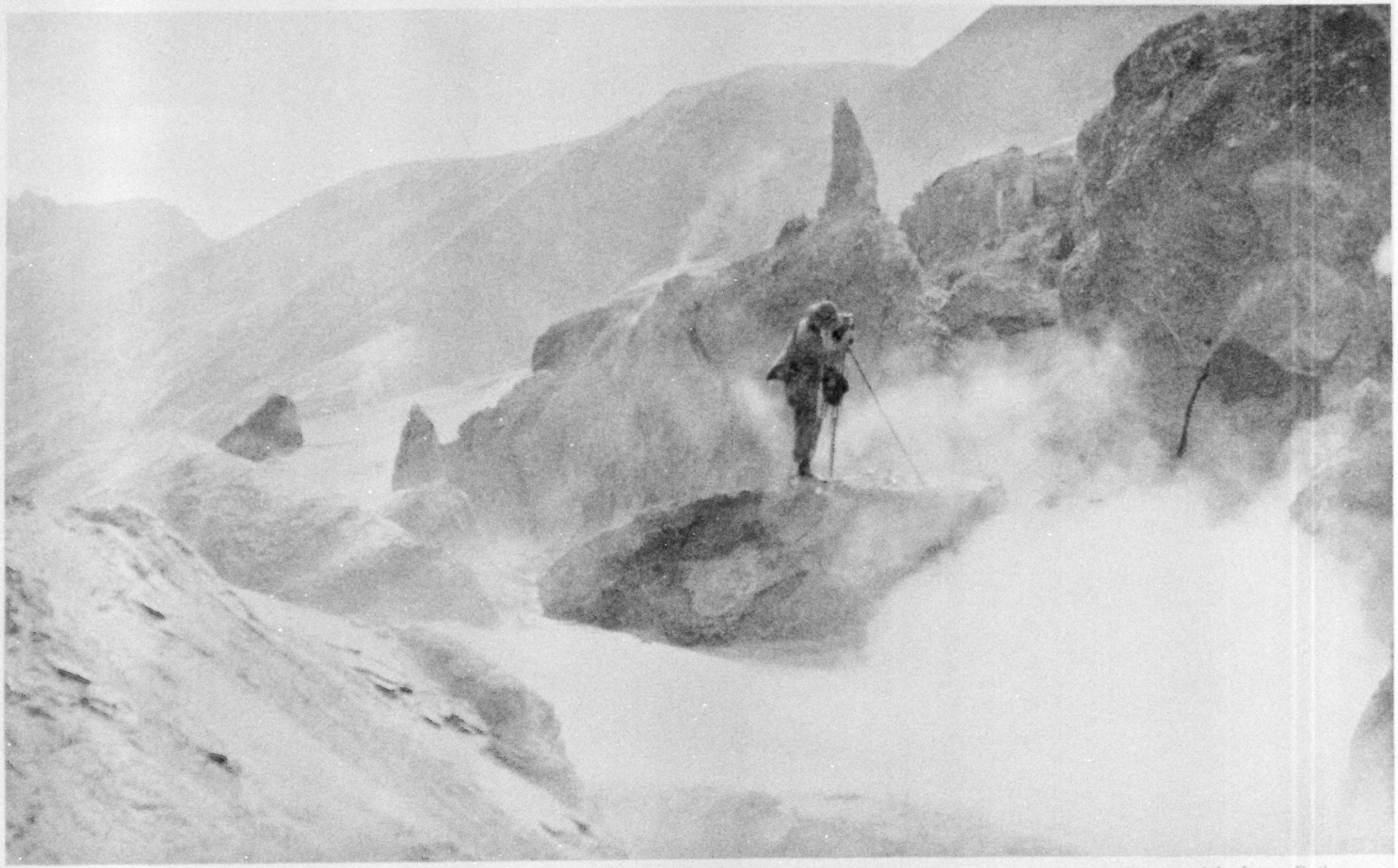


Photograph by Jasper D. Sayre

PHOTOGRAPHING ONE OF THE FUMAROLES IN THE VALLEY OF TEN THOUSAND SMOKES, 1918

The condition of this, as of other fumaroles, was precisely the same as when last seen the year previously.

Hagelbarger, volunteered to undertake the journey and to extend the scientific studies begun on the previous expeditions.

This party entered the valley not by the route heretofore used from the Pacific, but from the Bering Sea and Naknek Lake. As they came in they were able to explore much country hitherto but little known, discovering three good-sized lakes not previously shown on any map, Lake Tom and the two Savonoski lakes. They found the Naknek route by far the best way to get supplies into the country, and opened a trail up to the Valley of Ten Thousand Smokes from the head of the lake.

The country is so smooth and open in this direction that they consider it possible to use a motorcycle with a side-car attachment as a substitute for man-back packing. If this proves practicable, the expedition of 1919 will be able to work with a degree of comfort undreamed of in former years.

THE TEN THOUSAND SMOKES UNCHANGED

When they came up into sight of the Valley of Ten Thousand Smokes they saw at once that its volcanoes had not changed appreciably in the year's interval. In almost every detail the Smokes were exactly the same as in 1917. The only change observed was in the discovery of two areas of mud pots, which, if present, were overlooked the year before (see page 366). The Cookstove, Novarupta, and all the big vents were in exactly the same condition as when last seen.

Falling Mountain continued its remarkable activity, shooting off hundreds of tons of rock daily. Never, during the three seasons since it was discovered, has there elapsed a five-minute interval during periods of observation when its slopes were quiet. Throughout all three years great falls of rock have followed each other in such rapid succession from its lofty precipices that one avalanche of galloping boulders hardly reaches the bottom before another breaks loose from the summit.

Thus, although a series of rock-falls would seem necessarily much more ephemeral even than a volcano, the cause responsible for these avalanches on Falling Mountain, whatever it may be, has been continuously operative over a long period. It is very much hoped that the work of the coming season may yield some explanation of this remarkable Falling Mountain top.

SMOKE HOT ENOUGH TO MELT ZINC

The party of 1918 made the first measurements of the temperatures of the vents. They were so much hotter than had been expected that in 1917 we had been entirely unprepared to measure the temperatures we encountered, and had to resort to general descriptive terms instead of the precise statements which we would have desired. But in 1918 the expedition was supplied with suitable pyrometers by the Geophysical Laboratory of the Carnegie Institution and made many records of temperature throughout the valley.

As was anticipated, most of the larger vents were found to be far above the boiling point of water. The valley is so hot that hot springs, or geysers, are quite impossible in most places because all water is instantly vaporized. Many of the vents were found to be above 300° C. (572° F.), while a number exceeded 400° C. The hottest, 432° C. (810° F.), shown on page 364, was hot enough to melt zinc with ease.

It is clear that the studies made thus far give no indication of any diminution in the Smokes, much less do they suggest a probable date for their extinction. It may be considered established, therefore, that the Valley of Ten Thousand Smokes is a relatively permanent phenomenon.

The pictures that have been brought back have been sufficient to convince the world that it is indeed one of the greatest wonders of nature. But only those few human beings who have been privileged to enter the awesome confines of this great nest of volcanoes can realize how inadequate the pictures really are and how poor the impressions they convey of the real character of this wonder of wonders.

Far better than still pictures would be "movies," by which it would be possible to give some idea of the size of the place and of the ever-changing character of its smokes; how they surge up around the

XUM

Photograph by Paul R. Hagelbarger

THE HOTTEST FUMAROLE FOUND IN THE VALLEY

This little crack had a temperature of 432° C. (810° F.), more than hot enough to melt zinc. Probably some of the big volcanoes were even hotter, but their centers could not be reached with the instruments available in 1918.

men as they work; how they come roaring out from the myriad vents; how their gases are collected for study; how their temperatures are measured; how the expeditions cook their meals in the puffing steam; how enormous the volcanoes really are and how tremendously hot.

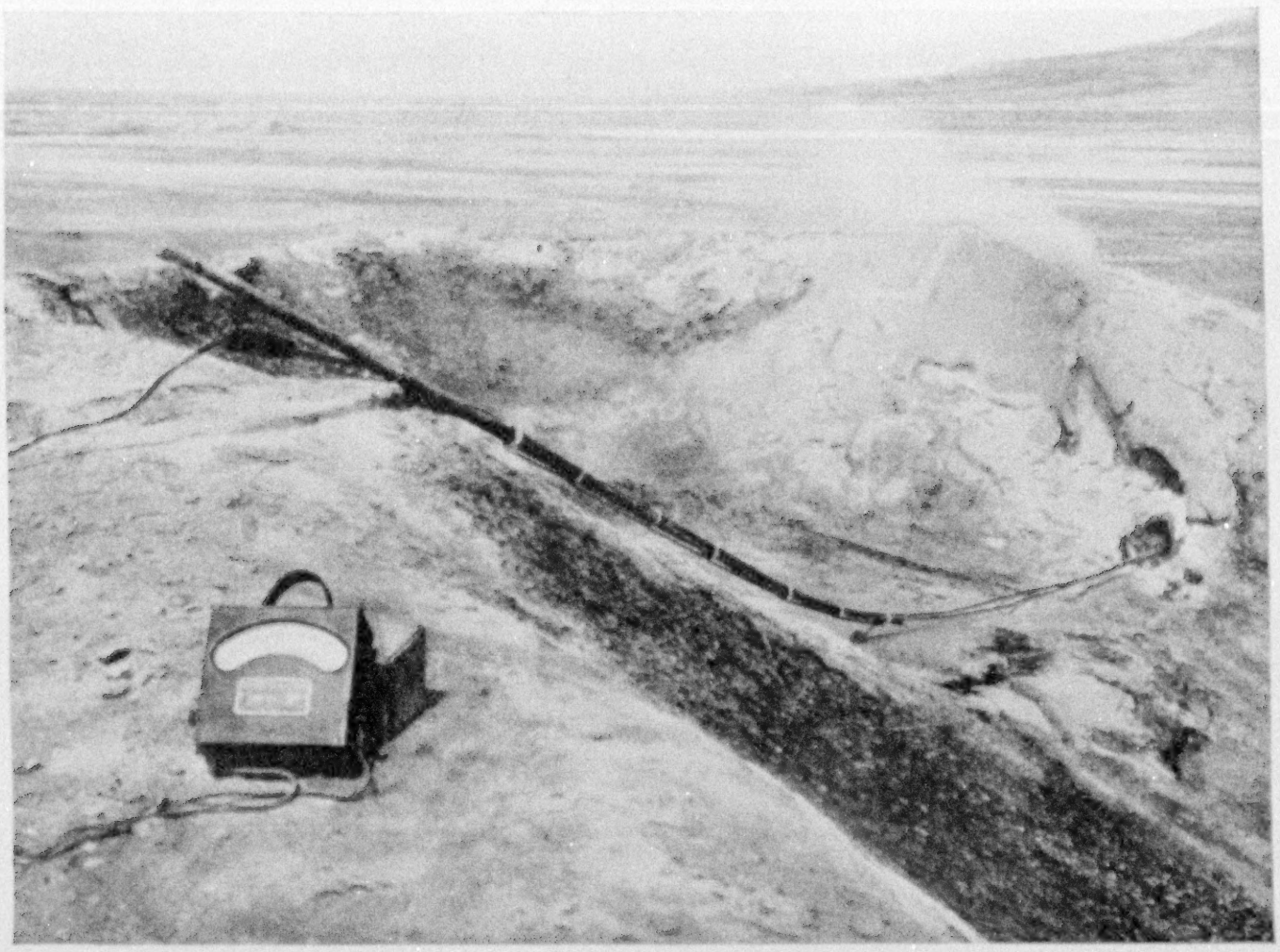
The projected expedition of 1919 plans to secure a series of films portraying the remarkable features of the district. The members of The Society will be glad to know that the production of motion pictures has been put in charge of Emery C. Kolb, one of the celebrated brothers whose adventurous trip through the Grand Canyon is familiar to all.*

But even the movies must fall very far short of the reality. The valley is one of those things which must be seen and studied before its real majesty begins to make itself felt.

Thus far no mortal man has ever entered its portals save only the members of the Katmai expeditions of the National Geographic Society. To all of those who have been thus privileged has come the desire to share the great wonder that has been theirs. They have felt that their mission of making the place known to the world would not be accomplished until it became possible for any one to visit its borders and behold for himself the stupendous spectacle there spread before him.

It is a special gratification, therefore, to the members of the National Geographic Society that the President of the United States has made this region an integral part of the great system of American National Parks, which command the admiration of the world.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1914, "Experiences in the Grand Canyon," by Ellsworth and Emery Kolb.



Photograph by Jasper D. Sayre

MEASURING THE TEMPERATURE OF A FUMAROLE

The temperature of this insignificant little hole was 300° C. (572° F.). Others in the same line near by ran above 400° C. (752° F.). The difference in temperature between the hot and cold junctions at opposite ends of the thermocouple sets up an electrical current whose intensity, recorded by the meter in the foreground, is a measure of the temperature.

PLANS FOR OPENING THE KATMAI DISTRICT

To many it will appear, doubtless, that the new Katmai National Monument is so remote that there is little possibility of its ever becoming a place of popular resort. But if one will examine the geographical situation of the area, he will see that it is far otherwise. It is much less remote and far more accessible than was the Yellowstone Park at the time of its creation. The difficulties incident to its exploitation as a show place are much less than those that have been so successfully overcome at the Grand Canyon, which thousands upon thousands of people visit without any realization of the problems that had to be solved ere their comfort and pleasure could be provided for.

Katmai and the Ten Thousand Smokes lie less than one hundred miles to one side of what is certainly destined to be the greatest tourist route in the world—the trip up along the Alaska coast by Kodiak and Cook Inlet into the interior via the new Government railroad now under construction.

From Kukak Bay, which is a fine harbor, suitable for the largest ships, it is but a scant 25 miles overland to the Crater of Katmai. If a suitable road were available, it would, therefore, be easy for one to leave a steamer after breakfast and in an automobile roll through the whole of the volcanic district in a single day, returning to his ship in time for dinner.

Few there are, to be sure, who would not be compelled by the wonders they saw to stop over until the next boat; but, so far as covering the ground is concerned, it would be only a short day's tour for a motor car.

The only problems are the road and the organization necessary to furnish the

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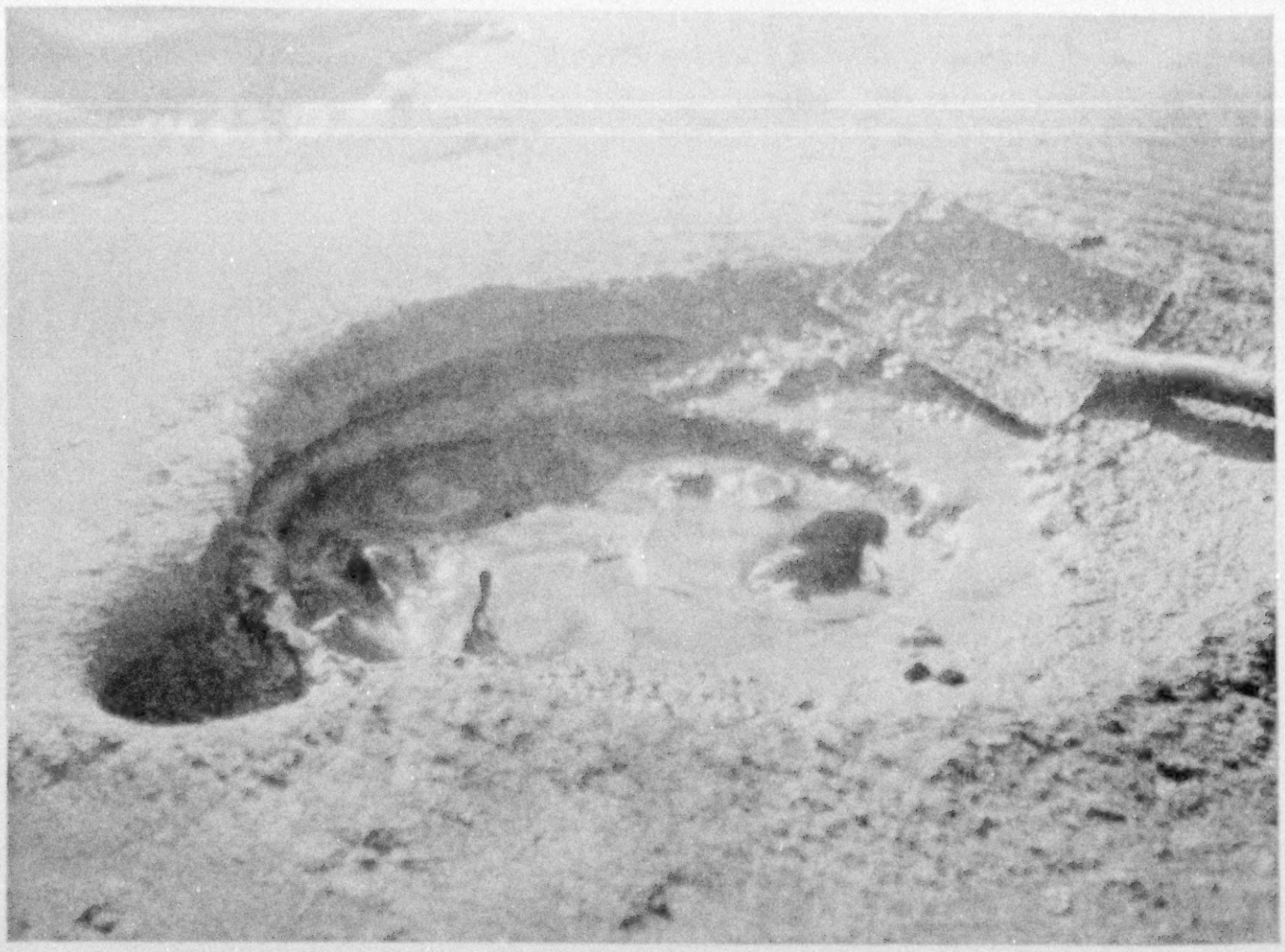


A LITTLE SPUTTERING MUD POT

Although common in the Yellowstone Park, such phenomena are rare in the Valley of Ten Thousand Smokes, for the reason that the temperature of the latter is for the most part so high that water is instantly vaporized.

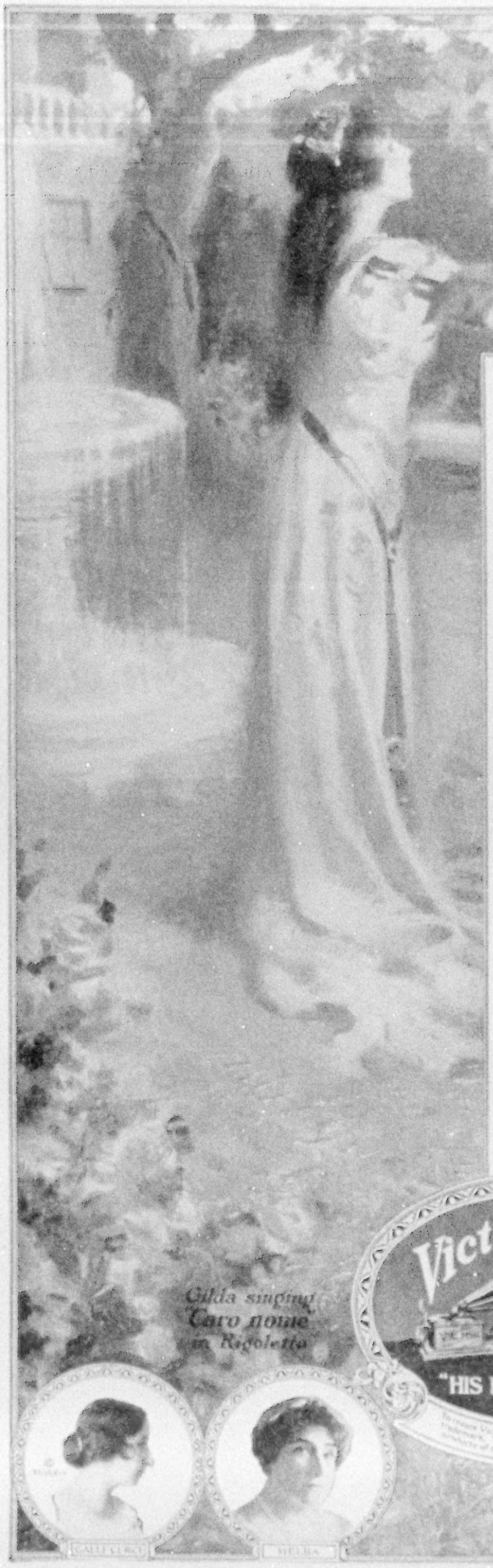
service required. The exploration of a route over the mountains for such a road is an important part of the program of the expedition the coming summer. If this quest is successful and a feasible route into the country be discovered, we shall begin to feel that the way is opened for the Katmai National Monument to become in fact, as well as in name, a real part of the National Park System, available, as it should be, for the perpetual enjoyment and education of the public.

THE SOCIETY'S EXPEDITION OF 1919

Realizing the importance to science of a further study of the mysterious forces at work in the Valley of Ten Thousand Smokes, the Board of Managers of the National Geographic Society has made a grant of $35,000 from the Society's Research Fund for explorations of Katmai during 1919.

Professor Griggs, who was the director of the National Geographic Society's Mt. Katmai expeditions of 1915, 1916, and 1917, and who supervised the work of the small expedition of 1918, will head The Society's expedition of 1919, which will be more elaborately equipped in every respect than any of the previous undertakings in this region.

Professor Griggs will have as his associates this year: Dr. E. T. Allen, of the Geophysical Laboratory of the Carnegie Institution, in charge of the chemical work; Dr. C. N. Fenner, of the Geophysical Laboratory, petrographer; E. G. Zies, of the Geophysical Laboratory, chemist; J. W. Shipley, chemist; Emery C. Kolb, motion-picture photographer; Frank I. Jones, photographer; J. S. Hine, zoölogist; Jasper D. Sayre, topographer; Paul R. Hagelbarger, topographer; Lucius C. Folsom, assistant to the director; D. B. Church, assistant photographer; A. J. Basinger, assistant zoölogist; Ralph Hagelbarger, Richard E. Helt, H. E. Jacob, August E. Miller, Julius Stone, Jr., H. N. Wallace, Charles Yori, and W. L. Henning, assistants.



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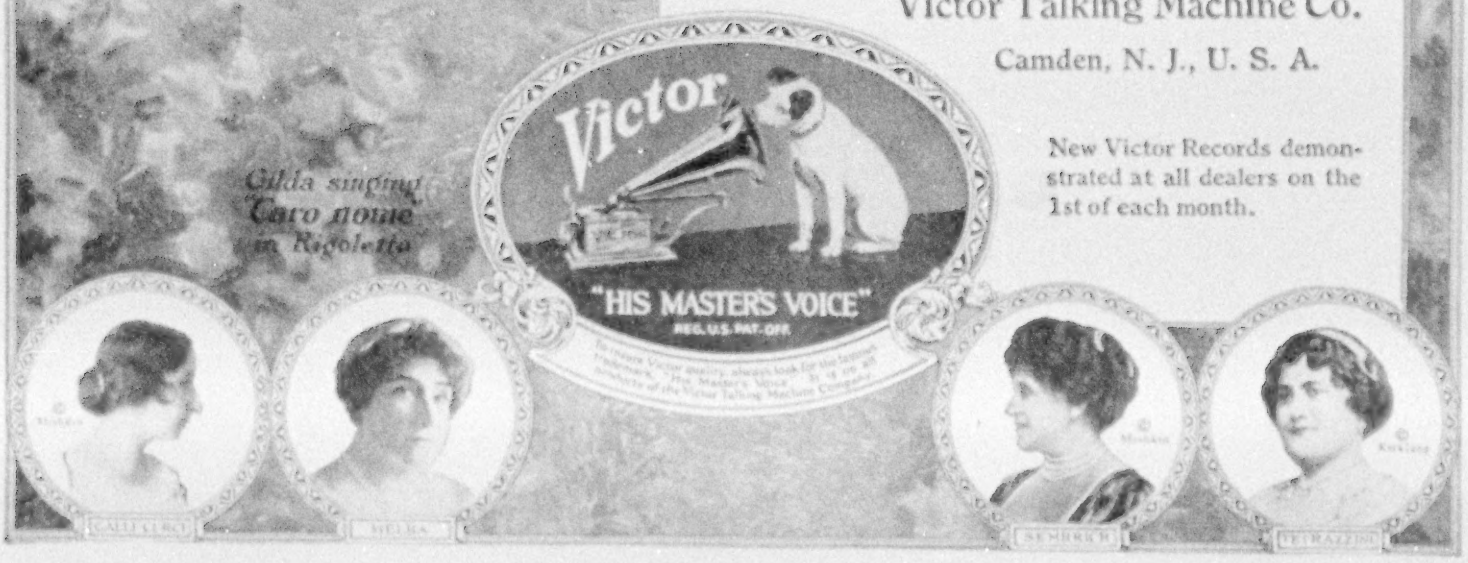

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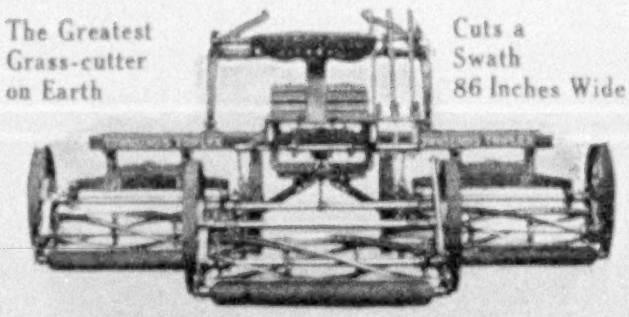

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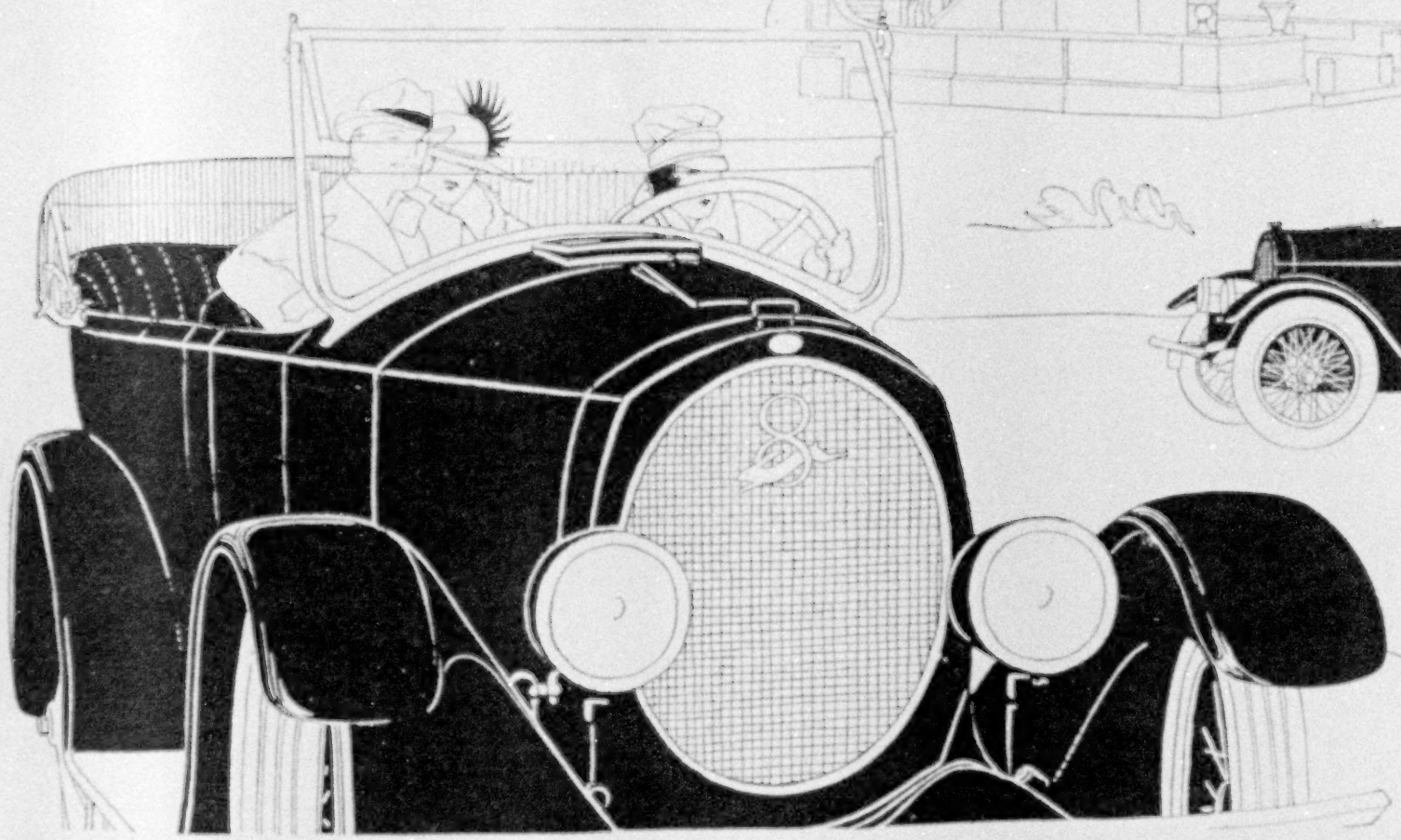

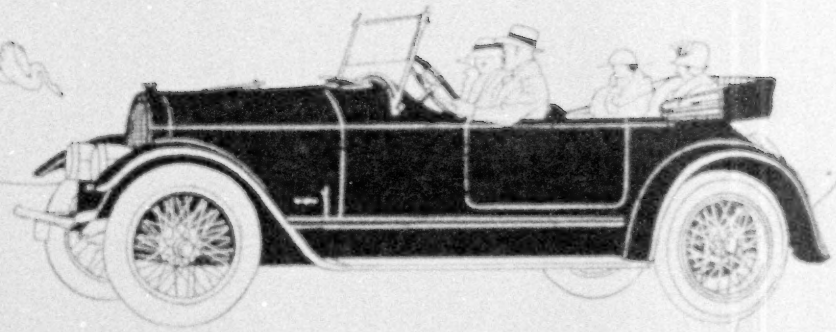

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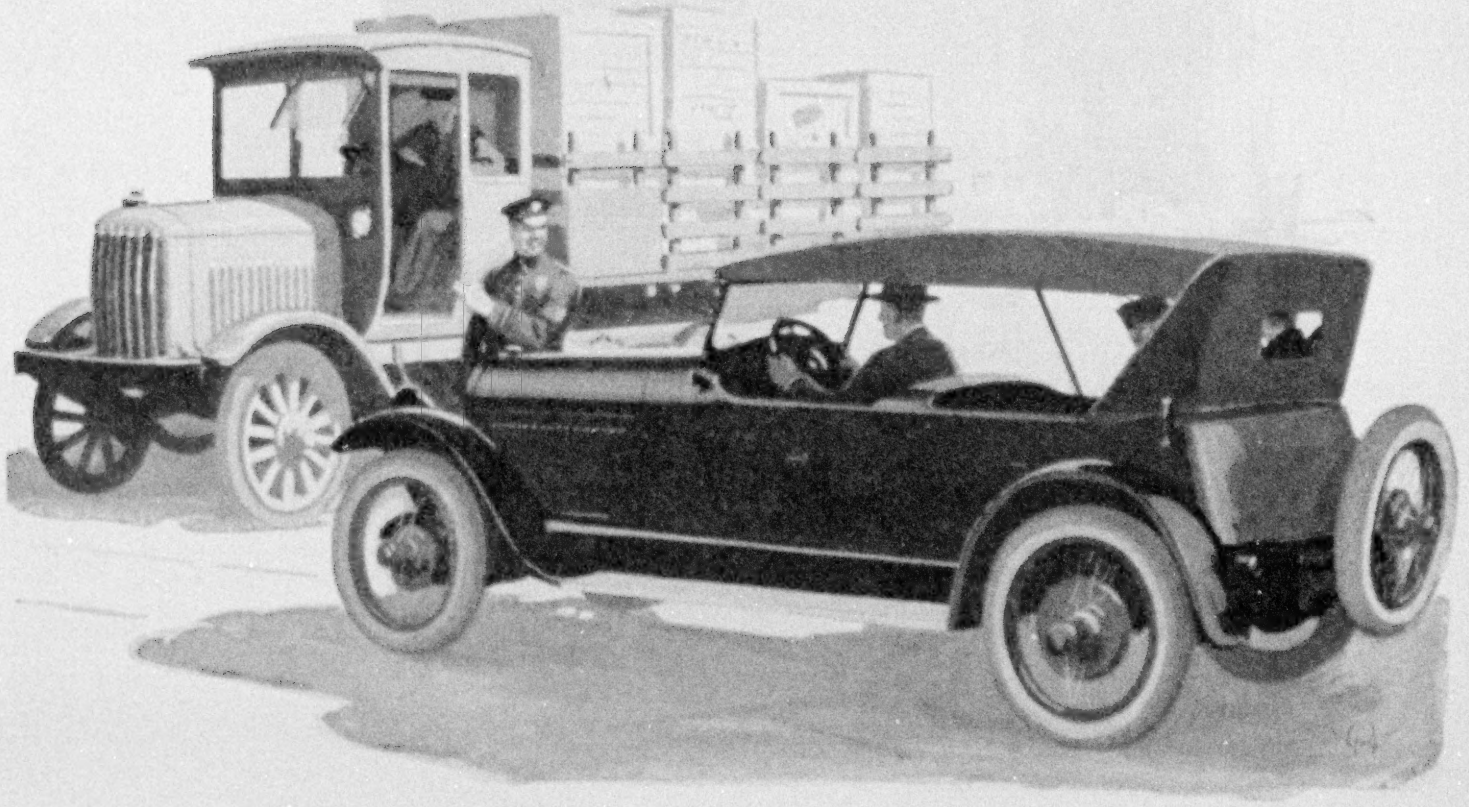

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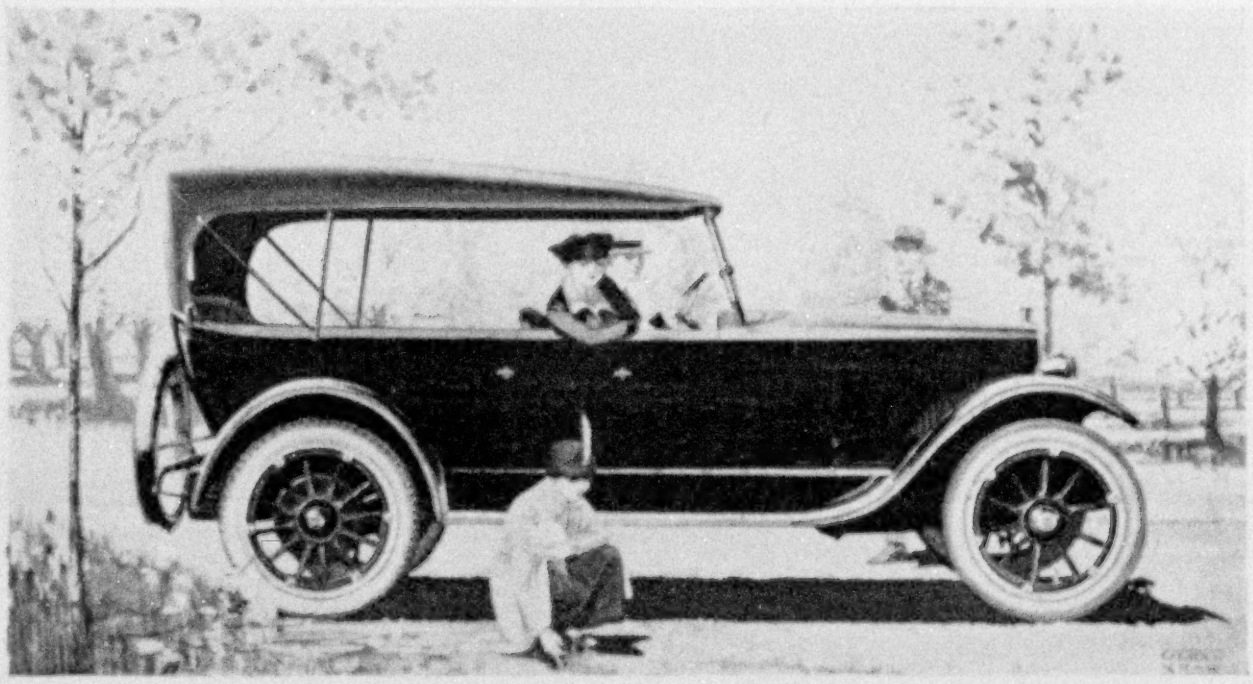

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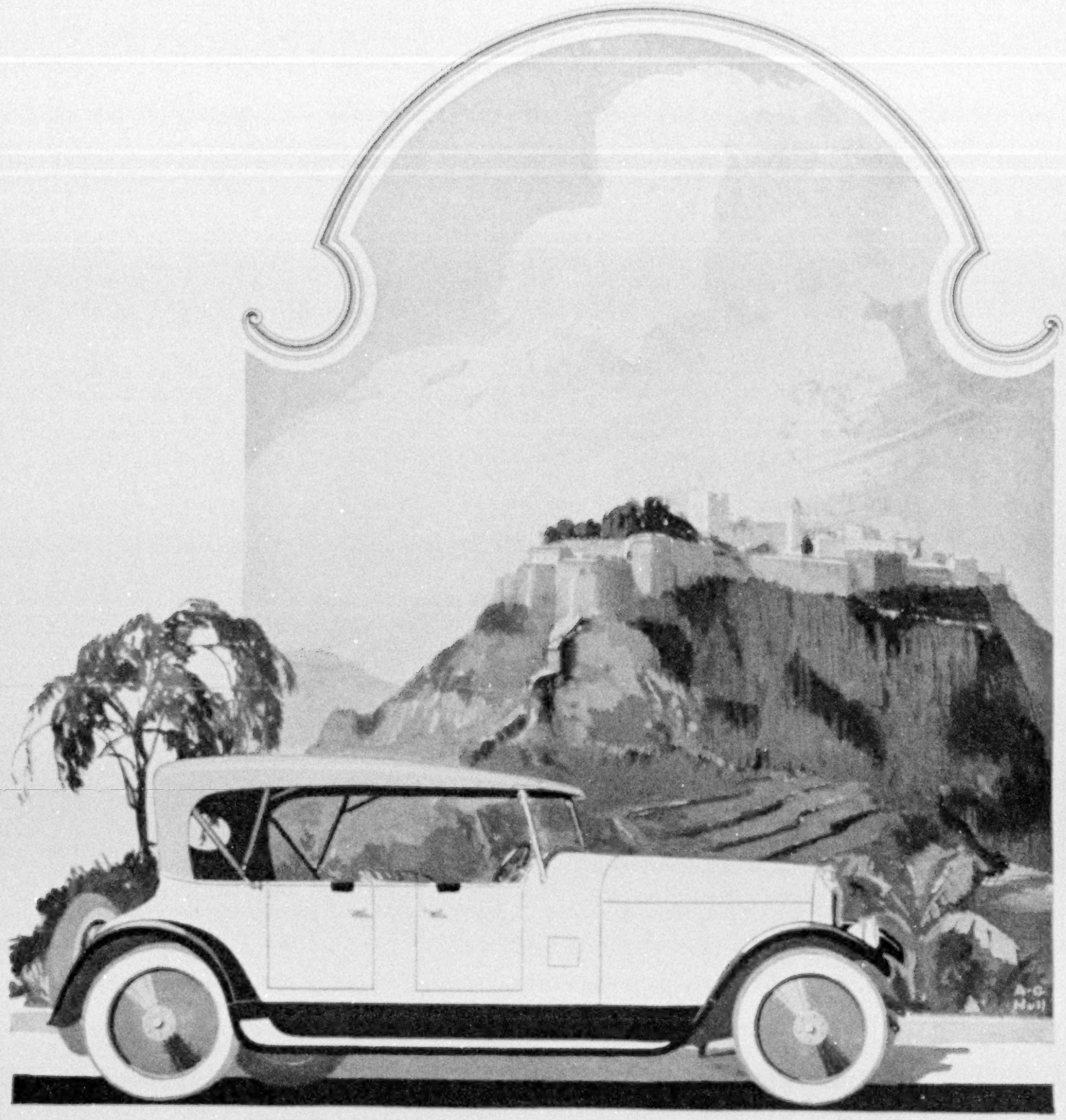

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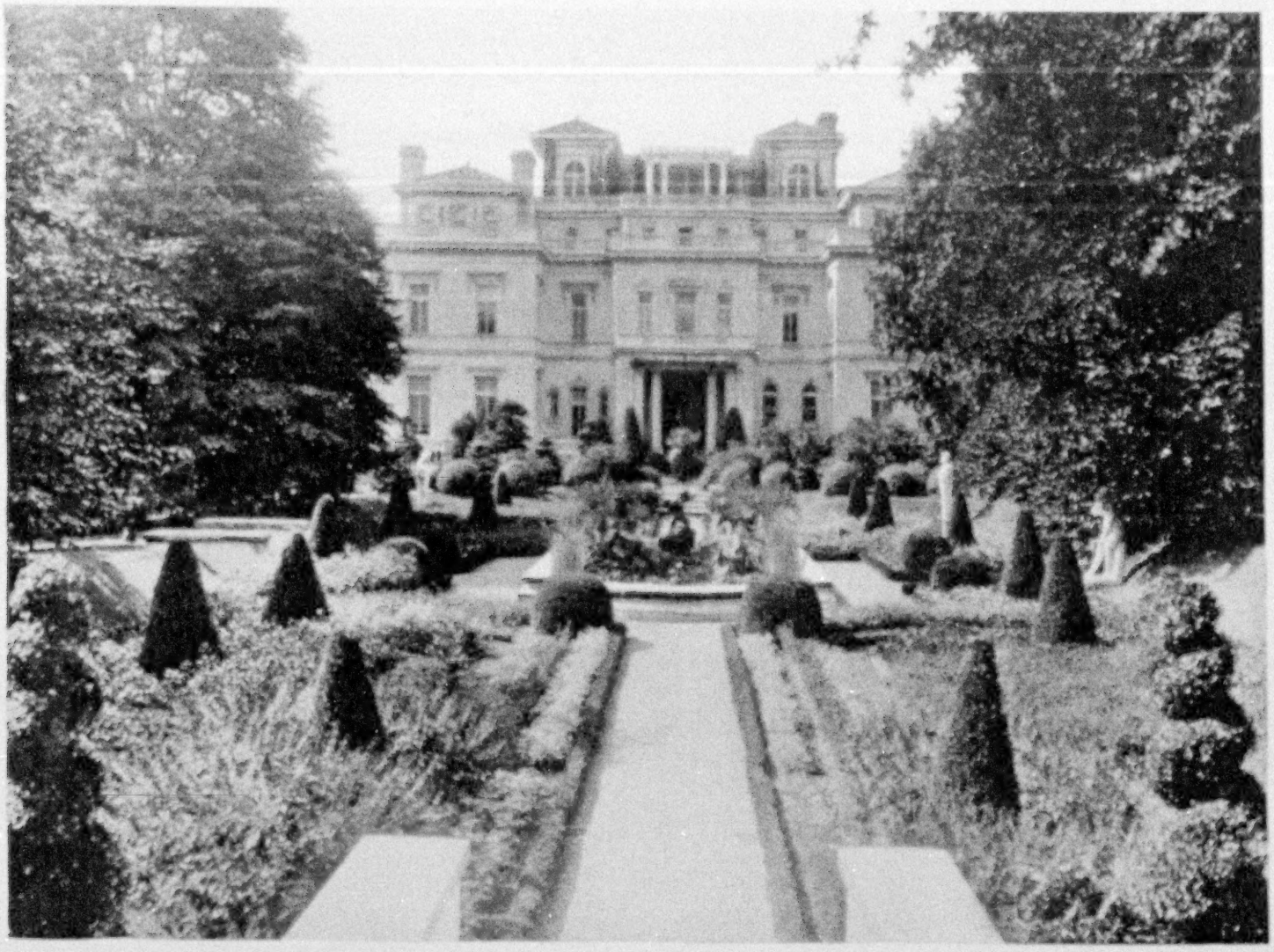

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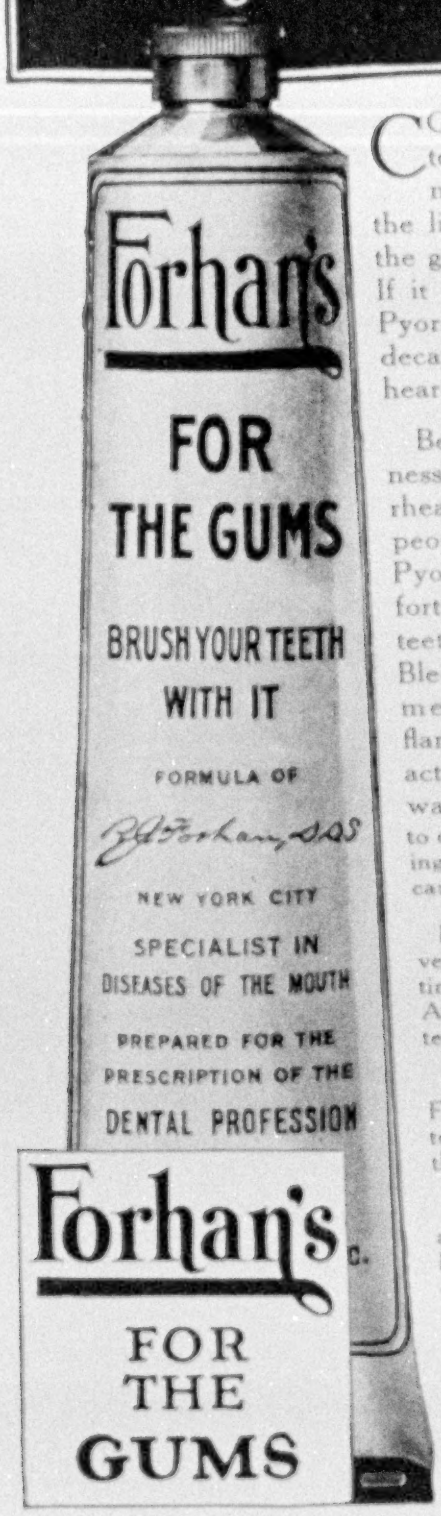

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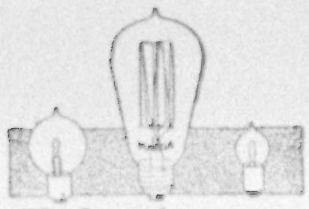

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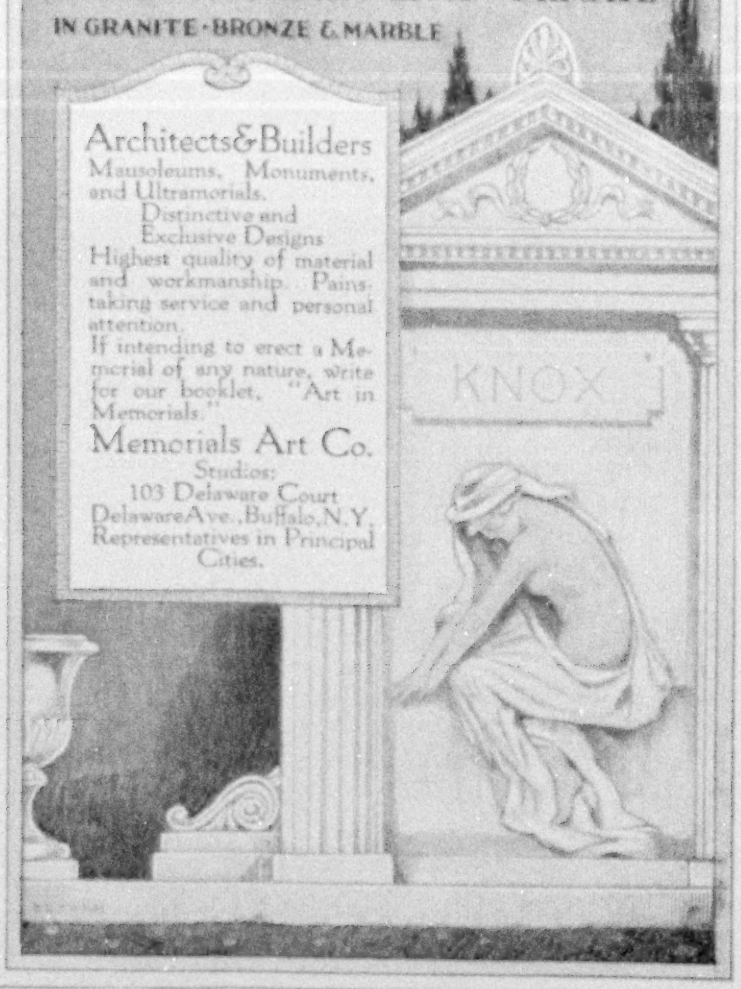

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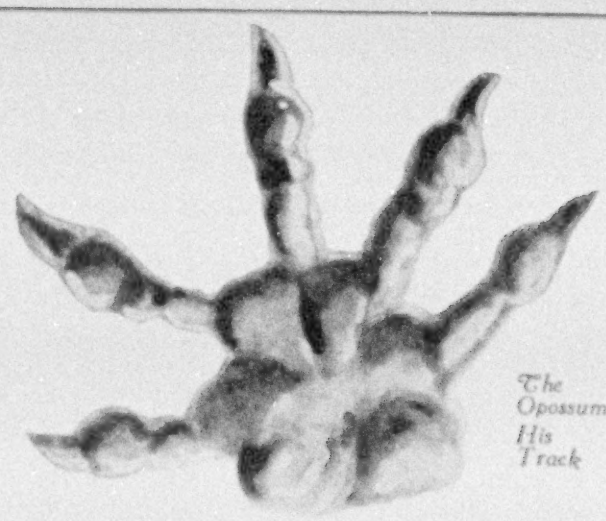

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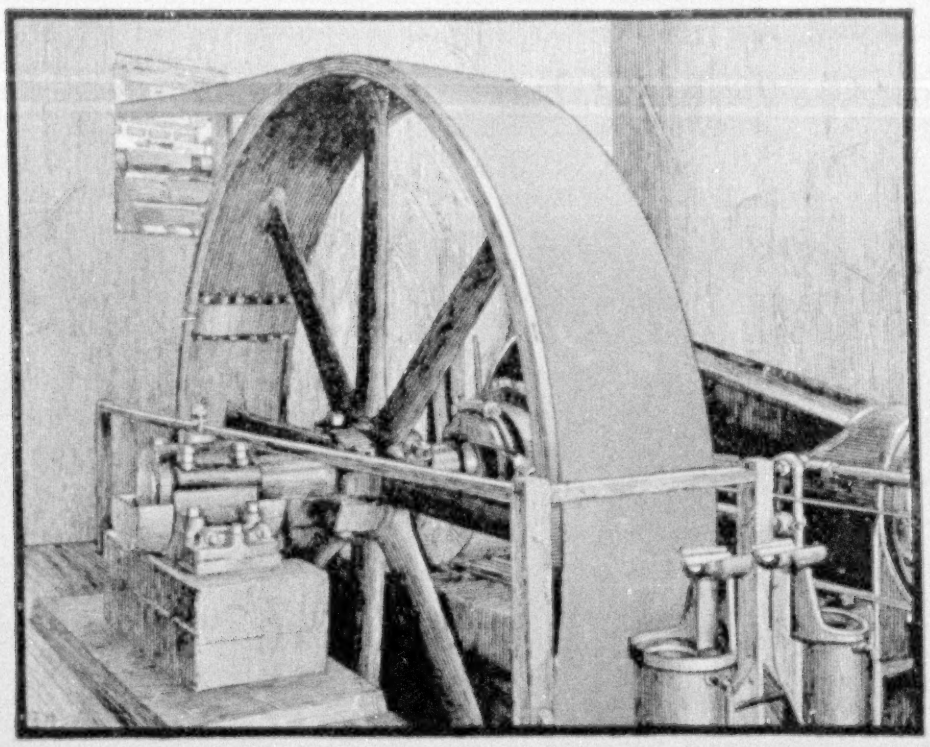

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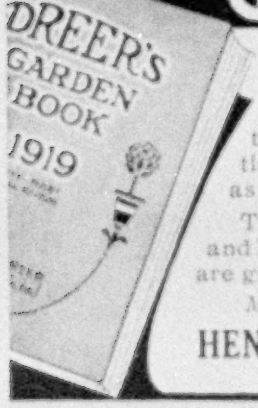

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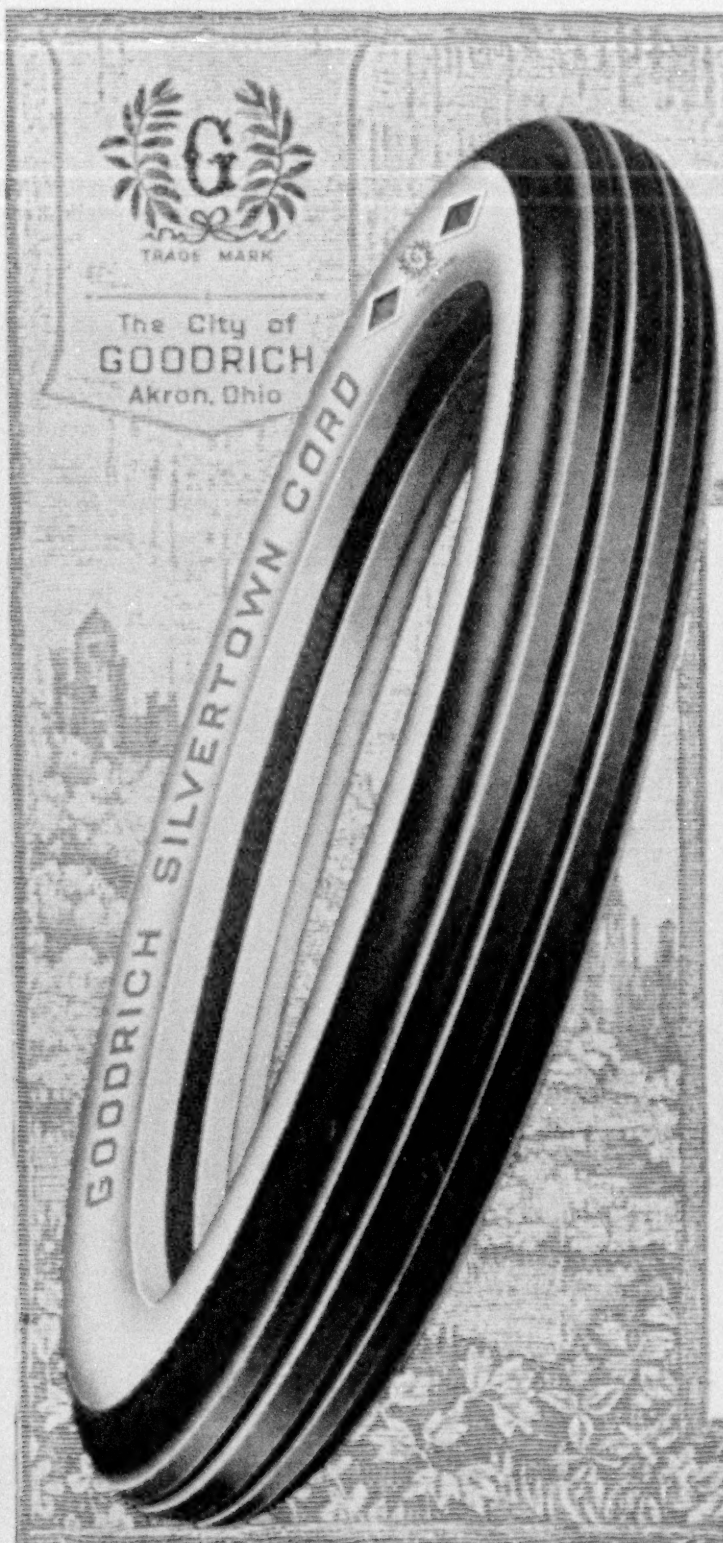

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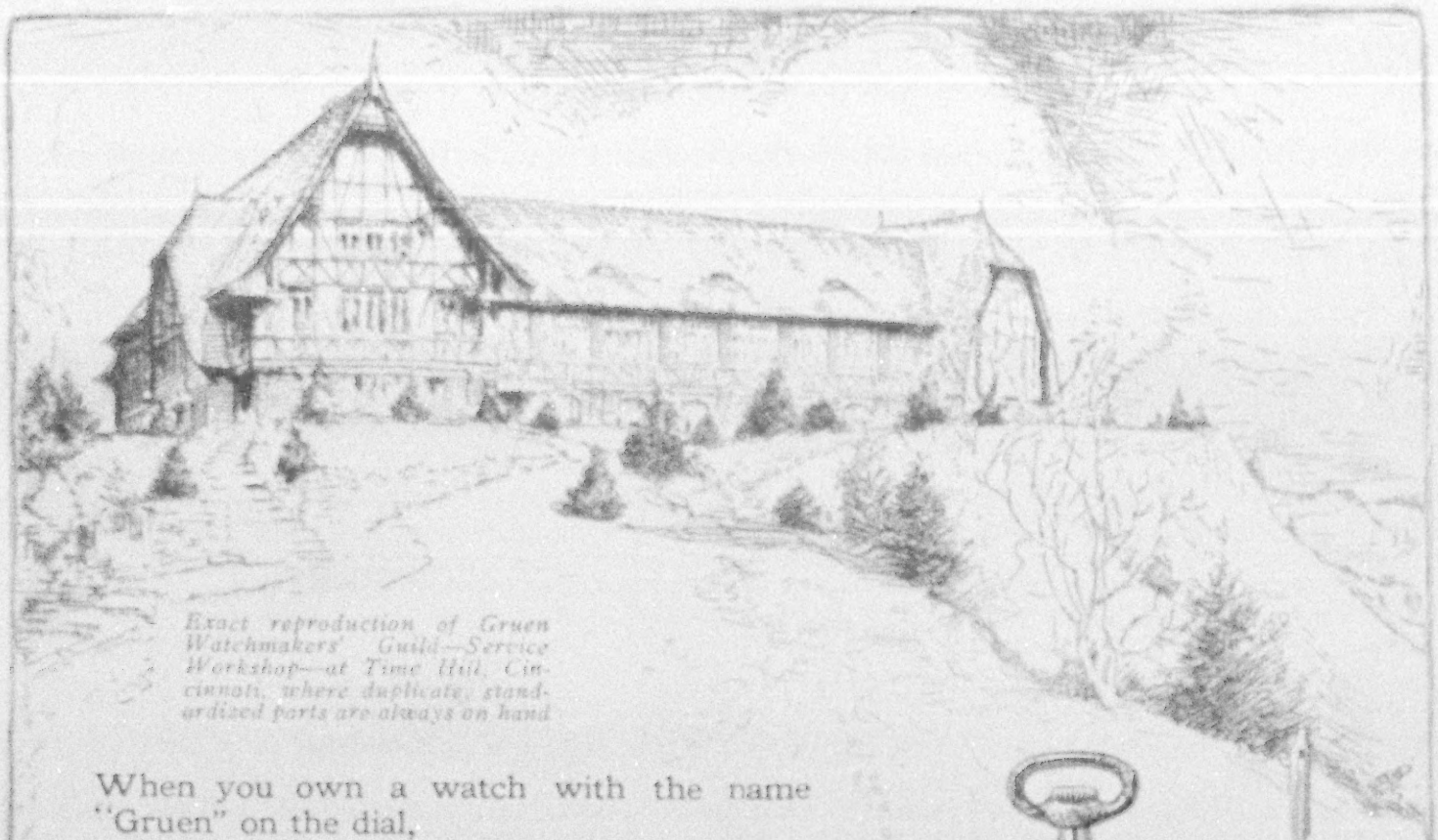

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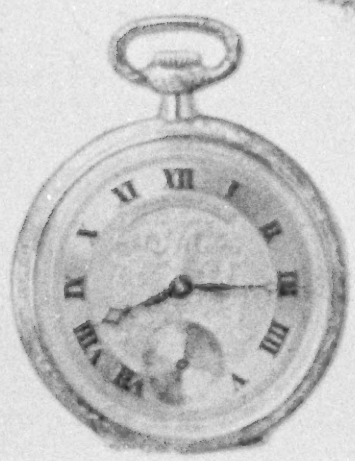

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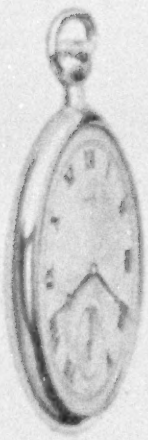

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